Economic & Planning Systems

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**DRAFT REPORT**

# ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR VERNAL POOL SPECIES

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EPS #12413

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# PREFACE

1. The U.S. Fish and Wildlife Service has added this preface to all economic analyses of critical habitat designations:

2. "The standard best practice in economic analysis is applying an approach that measures costs, benefits, and other impacts arising from a regulatory action against a baseline scenario of the world without the regulation. Guidelines on economic analysis, developed in accordance with the recommendations set forth in Executive Order 12866 ("Regulatory Planning and Review"), for both the Office of Management and Budget and the Department of the Interior, note the appropriateness of the approach:

3. The baseline is the state of the world that would exist without the proposed action. All costs and benefits that are included in the analysis should be incremental with respect to this baseline.'

4. "When viewed in this way the economic impacts of critical habitat designation involve evaluating the 'without critical habitat' baseline versus the 'with critical habitat' scenario. Impacts of a designation equal the difference, or the increment, between these two scenarios. Measured differences between the baseline and the scenario in which critical habitat is designated may include (but are not limited to) changes in land use, environmental quality, property values, or time and effort expended on consultations and other activities by federal landowners, federal action agencies, and in some instances, State and local governments and/or private third parties. Incremental changes may be either positive (benefits) or negative (costs).

5. "In New Mexico Cattle Growers Ass'n v. U.S.F.W.S., 248 F.3d 1277 (10th Cir. 2001), however, the 10th Circuit recently held that the baseline approach to economic analysis of critical habitat designations that was used by the Service for the southwestern willow flycatcher designation was 'not in accord with the language or intent of the ESA.' In particular, the court was concerned that the Service had failed to analyze any economic impact that would result from the designation, because it took the position in the economic analysis that there was no economic impact from critical habitat that was incremental to, rather than merely co-extensive with, the economic impact of listing the species. The Service had therefore assigned all of the possible impacts of designation to the listing of the species, without acknowledging any uncertainty in this conclusion or considering such potential impacts as transaction costs, reinitiations, or indirect costs. The court rejected the baseline approach incorporated in that designation, concluding that, by obviating the need to perform any analysis of economic

impacts, such an approach rendered the economic analysis requirement meaningless: 'The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase.'

6. "In this analysis, the Service addresses the 10th Circuit's concern that we give meaning to the ESA's requirement of considering the economic impacts of designation by acknowledging the uncertainty of assigning certain post-designation economic impacts (particularly section 7 consultations) as having resulted from either the listing or the designation. The Service believes that for many species the designation of critical habitat has a relatively small economic impact, particularly in areas where consultations have been ongoing with respect to the species. This is because the majority of the consultations and associated project modifications, if any, already consider habitat impacts and as a result, the process is not likely to change due to the designation of critical habitat. Nevertheless, we recognize that the history of consultations on critical habitat is not broad, and, in any particular case, there may be considerable uncertainty whether an impact is due to the critical habitat designation or the listing alone. We also understand that the public wants to know more about the kinds of costs consultations impose and frequently believe that designation could require additional project modifications.

7. "Therefore, this analysis incorporates two baselines. One addresses the impacts of critical habitat designation that may be 'attributable co-extensively' to the listing of the species. Because of the potential uncertainty about the benefits and economic costs resulting from critical habitat designations, we believe it is reasonable to estimate the upper bounds of the cost of project modifications based on the benefits and economic costs of project modifications that would be required due to consultation under the jeopardy standard. It is important to note that the inclusion of impacts attributable co-extensively to the listing does not convert the economic analysis into a tool to be considered in the context of a listing decision. As the court reaffirmed in the southwestern willow flycatcher decision, 'the ESA clearly bars economic considerations from having a seat at the table when the listing determination is being made.'

8. "The other baseline, the lower boundary baseline, will be a more traditional rulemaking baseline. It will attempt to provide the Service's best analysis of which of the effects of future consultations actually result from the regulatory action under review – i.e. the critical habitat designation. These costs will in most cases be the costs of additional consultations, reinitiated consultations, and additional project modifications that would not have been required under the jeopardy standard alone as well as costs resulting from uncertainty and perceptional impacts on markets."

DATED: March 20, 2002

# EXECUTIVE SUMMARY

9. The purpose of this report is to identify and analyze the potential economic effects of the proposed designation of critical habitat for vernal pool species (consisting of 4 aquatic crustaceans and 11 plants). This report was prepared by Economic & Planning Systems, Incorporated (EPS), under subcontract to Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service's Division of Economics.

10. Section 4(b)(2) of the Endangered Species Act (the Act) requires that the U.S. Fish and Wildlife Service (the Service) base the designation of critical habitat upon the best scientific and commercial data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

11. The focus of this economic analysis is on section 7 of the Act, which requires Federal agencies to insure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. Federal agencies are required to consult with the Service whenever they propose an action that may affect a listed species or its designated critical habitat. Aside from the protection that is provided under section 7, the Act does not provide other forms of protection to lands designated as critical habitat. Because consultation under section 7 only applies to activities that are carried out, permitted, or funded by a Federal agency, the designation of critical habitat will not afford any additional protections for species with respect to strictly private activities.

## PROPOSED CRITICAL HABITAT

12. The Service proposes to designate critical habitat for vernal pool species in 37 counties in California and Oregon. Only one county in Oregon, Jackson County, is included in the proposed critical habitat designation. The county is treated in this analysis as its own region, even if it functions as part of a larger economic region in the state of Oregon.

13. California's share of the 1,663,442 acres of proposed critical habitat represents 1.7 percent of California's total land area, and Jackson County, Oregon's share

represents 0.01 percent of Oregon's total land area.[1] The 1,663,442 acres of land area (100 percent of total proposed critical habitat) are distributed across ten regions of the two states as follows:

- San Joaquin Valley Region, 715,812 acres (43 percent)
- Upper Sacramento Valley Region, 273,361 acres (17 percent)
- Central Coast Region, 254,445 acres (15 percent)
- Sacramento Valley Region, 160,955 acres (10 percent)
- San Francisco Bay Area, 110,004 acres (7 percent)
- Southern California, 77,467 acres (5percent)
- Mountain Region, 33,147 acres (2 percent)
- Sierra Nevada Foothills Region, 23,806 acres (1 percent)
- Jackson County, Oregon, 7,621 acres (<1 percent)
- Northern Coast Region, 6,824 acres (<1 percent)

14. **Map 1** illustrates the regions and the counties included within each region. Not every county within each region has proposed critical habitat. In addition, the regions do not encompass every county. When counties did not have proposed vernal pool species critical habitat and were not part of a region containing proposed critical habitat, the counties were not assigned to a region.

## FRAMEWORK AND ECONOMIC IMPACTS CONSIDERED

15. This analysis first identifies land use activities within or in the vicinity of those areas being proposed for critical habitat that are likely to be affected by section 7 of the Act. To do this, the analysis evaluates a "without section 7" scenario and compares it to a "with section 7" scenario. The "without section 7" scenario constitutes the baseline of this analysis. It represents the level of protection currently afforded the species under the Act, absent section 7 protective measures, and including other Federal, State, and local laws. The "with section 7" scenario identifies land use activities likely to involve a Federal nexus that may affect the species or its designated critical habitat, which accordingly have the potential to be subject to future consultations under section 7 of the Act.

16. Economic activities identified as likely to be affected under section 7 and the resulting impacts that section 7 can have on such activities constitute the upper-bound estimate of the proposed critical habitat economic analysis. By defining the upper-bound estimate to include both jeopardy and adverse modification impacts, the analysis recognizes the difficulty in sometimes

[1]Acreages shown throughout the report are different from those in the proposed rule dated September 24, 2002. The difference, which is caused by geographic information systems software spatial analysis estimation routines, is minor and generates a difference of no more than 0.04 percent of the total.

# Map 1
# Regional Groupings of California and Oregon Counties [1]


*Prepared By EPS*
*Project #12413*
*9/9/02*

[1] The map depicts regions of either state where critical habitat has been proposed for one or more counties. Not every county in each region contains proposed habitat or impacts due to section 7 implementation.

differentiating between the two in evaluating only the critical habitat effects associated with the proposed rulemaking. This step is adopted in order to ensure that any critical habitat impacts that may occur co-extensively with the listing of the species (i.e., jeopardy) are not overlooked in the analysis.

17. Upon identifying section 7 impacts, the analysis proceeds to consider the subset of impacts that can be attributed exclusively to the critical habitat designation. To do this, the analysis adopts a "with and without critical habitat approach." This approach is used to determine those effects found in the upper-bound estimate that may be attributed solely to the proposed designation of critical habitat.

18. Specifically, the "with and without critical habitat" approach considers section 7 impacts that will likely be associated with the implementation of the jeopardy provisions of section 7 and those that will likely be associated with the implementation of the adverse modification provision of section 7. In many cases, impacts associated with the jeopardy standard remain unaffected by the designation of critical habitat and thus would not normally be considered an effect of a critical habitat rulemaking. The subset of section 7 impacts likely to be affected solely by the designation of critical habitat represent the lower-bound estimate of this analysis. It is important to note that the "low" and "high" cost columns in **Tables ES-1**, **ES-2**, **7**, **8**, **9**, **10**, **17,** and **18** refer to cost item ranges and not the concept of lower-bound and upper-bound estimates explained here.

19. The critical habitat designation for vernal pool species encompasses land under Federal, state, local government, and private ownership. For private lands subject to critical habitat designation, section 7 consultations and modifications to land uses and activities can only be required when a Federal nexus, or connection, exists. A Federal nexus arises if the activity or land use of concern involves Federal permits, Federal funding, or another form of Federal involvement. Section 7 consultations are not required for activities on non-Federal lands that do not involve a Federal nexus.

20. In addition to lands contained within the proposed critical habitat designation, this report will examine adjacent activities sponsored or permitted by Federal agencies that may affect vernal pool species and/or adversely modify the proposed critical habitat.

21. This report estimates impacts of listing and critical habitat designation on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Accordingly, the analysis bases estimates on activities that are likely to occur within a 20-year time horizon.

22. Two primary categories of potential costs are considered in the analysis. These categories are:

- Costs associated with identifying the effect of the designation on a particular parcel or land use activity (e.g., technical assistance, section 7 consultations).

- Costs associated with any modifications to projects, activities, or land uses resulting from the outcome of section 7 consultations with the Service.

## SECTION 7 COSTS

23. The majority of future section 7 consultations associated with the area proposed as critical habitat for vernal pool species are likely to address military base operations and training, Federal water supply and delivery contracts, land development, and Federal forest management. This analysis estimates that, over 20 years, approximately 228 additional formal consultations and 716 informal consultations will occur on projects with the potential to affect the proposed critical habitat area. In addition, it is expected that the Service will provide technical assistance to parties on 213 occasions. Many consultations are likely to result in Service recommendations for project modifications. In addition, some section 7 applicants may voluntarily incorporate project modifications in anticipation of the consultation process, even when these modifications are not explicitly recommended by the Service.

24. Results of the economic analysis of section 7 activity in the proposed designation of critical habitat for vernal pool species are shown by action agency and project type in **Table ES-1**. The more notable impacts are summarized below by project type:

- **Land development:** Private landowners whose private projects will likely be required to mitigate the fill of vernal pools are expected to enter into 69 formal consultations, 208 informal consultations, and 173 instances of technical assistance. This consultation activity is estimated to cost between $1.8 and $4.0 million. The project modification costs from section 7 consultations are estimated at $116.4 million.

- **Runway extensions:** Four local governments have airport projects within vernal pool species proposed critical habitat. These runway extension projects are likely to result in section 7 consultations estimated to cost between $55,600 and $89,200. The four project modifications have a value of $1.9 million.

- **Construction and maintenance of state highways:** Nine local governments have highway construction or maintenance projects within vernal pool species proposed critical habitat. These projects are likely to result in section 7 consultations estimated to cost between $1.5 million and $4.2 million. The nine project modifications have a value of $764,000.

**Table ES-1**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Total Section 7 Costs by Land Use Activity**

| CONSULTATION NEXUS<br>Project Owner/Activity | Action Agency | Administrative Costs [1] | | Project Modification Costs [2] | TOTAL COST | |
|---|---|---|---|---|---|---|
| | | *Low* | *High* | | ***Low*** | ***High*** |
| **Department of Defense** | | | | | | |
| Base operations and training | DOD | $245,800 | $457,800 | $2,350,000 | **$2,595,800** | **$2,807,800** |
| Facilities construction | DOD | $11,000 | $18,200 | - | **$11,000** | **$18,200** |
| **State and Local Governments** | | | | | | |
| Runway extensions | FAA | $55,600 | $89,200 | $1,860,000 | **$1,915,600** | **$1,949,200** |
| Construction of high speed rail systems | FRRA | $13,900 | $22,300 | - | **$13,900** | **$22,300** |
| Construction of transit maintenance facilities | FTA | $13,900 | $22,300 | - | **$13,900** | **$22,300** |
| Construction and maintenance of state highways | FHWA | $1,551,200 | $4,197,600 | $764,000 | **$2,315,200** | **$4,961,600** |
| Disaster response | FEMA | $83,400 | $133,800 | - | **$83,400** | **$133,800** |
| **Public and Private Entities** | | | | | | |
| Discharge to US waters | EPA | $50,880 | $100,040 | - | **$50,880** | **$100,040** |
| Characterization and cleanup of contaminated sites | EPA | $131,920 | $224,560 | - | **$131,920** | **$224,560** |
| **Public and Private Utilities; Energy Companies** | | | | | | |
| Operation of hydroelectric facilities | FERC | $38,480 | $109,240 | - | **$38,480** | **$109,240** |
| Authorization to establish an interconnection | WAPA | $83,500 | $151,100 | - | **$83,500** | **$151,100** |
| Oil pipeline conversion | FERC | $4,020 | $11,360 | - | **$4,020** | **$11,360** |
| **Western Area Power Administration** | | | | | | |
| Maintenance of power lines | WAPA | $53,200 | $100,800 | - | **$53,200** | **$100,800** |
| **Bureau of Reclamation** | | | | | | |
| Maintenance of water facility ROW | BOR | $9,200 | $28,000 | - | **$9,200** | **$28,000** |
| Power plant construction | BOR | $11,000 | $18,200 | - | **$11,000** | **$18,200** |
| Water supply and delivery contracts | BOR | $509,000 | $938,000 | - | **$509,000** | **$938,000** |
| **Native American Governments** | | | | | | |
| Fire protection | BIA | $149,400 | $243,000 | $406,000 | **$555,400** | **$649,000** |
| Casino construction | BIA | $13,900 | $22,300 | $860,000 | **$873,900** | **$882,300** |
| **Private Landowners** | | | | | | |
| Land development | ACOE | $1,839,746 | $3,980,920 | $116,412,678 | **$118,252,424** | **$120,393,597** |
| Agricultural conversion | ACOE | - | - | - | **-** | **-** |
| **Fish and Wildlife Service** | | | | | | |
| National Wildlife Refuge operations | FWS | $11,000 | $18,200 | - | **$11,000** | **$18,200** |
| National Wildlife Refuge mosquito/weed control | FWS | $110,000 | $182,000 | - | **$110,000** | **$182,000** |
| Habitat Conservation Program | FWS | $25,300 | $77,000 | - | **$25,300** | **$77,000** |
| **Forest Service** | | | | | | |
| Forestry research | USFS | $22,000 | $36,400 | - | **$22,000** | **$36,400** |
| Forest management | USFS | $376,500 | $702,800 | $255,000 | **$631,500** | **$957,800** |
| **20 YEAR TOTAL** | | **$5,413,846** | **$11,885,120** | **$122,907,678** | **$128,321,524** | **$134,792,797** |
| **ANNUALIZED TOTAL** | | **$270,692** | **$594,256** | **$6,145,384** | **$6,416,076** | **$6,739,640** |

*"All_Sect_7"*

[1] Administrative costs include technical assistance, informal consultations, formal consultations, and biological assessments.
[2] Some activities of federal agencies have zero projection modification costs.

- **Fire protection:** Bureau of Indian Affairs fire protection activities are likely to result in six formal consultations and six programmatic consultations with tribes. These activities are estimated to cost between $149,000 and $243,000. The six project modifications have a value of $406,000.

- **Casino construction:** One private concern has a casino construction project on tribal land that, given the property's vernal pool habitat, is likely to result in a section 7 consultation. The consultation is estimated to cost between $13,900 and $22,300. Based on previous consultation experience on projects of this type, the project modification has a value of $860,000.

- **Forest management:** The U.S. Forest Service estimates that it will engage in 29 formal and 25 informal consultations with the Service for grazing allotment administration and off-highway vehicle trail construction activities within vernal pool species proposed critical habitat. This section 7 activity is estimated to cost between $377,000 and $703,000. The project modifications for this agency are likely to cost $255,000.

- **Stigma effects:** Stigma effects are associated with uncertainty over the economic implications of critical habitat designation. Stigma effects may affect the future value of private land transactions that occur prior to development and would be most pronounced in the early years following critical habitat designation. Vernal pool critical habitat designation stigma impacts may result in lower land values on up to 26,400 acres of private land, though are most likely to occur in sales of those parcels that are transacted in the next several years. The size of this impact is impossible to quantify at this time and would be due solely to the designation of critical habitat.

- **All others:** All remaining projects having a Federal nexus are estimated to be associated with approximately 40 instances of technical assistance, 83 informal consultations, and 104 formal consultations. No project modification costs, however, are expected for these activities.

25. Over the next 20 years, there will be an estimated total of $5.4 to $11.9 million in administrative costs and $122.9 million in project modification costs associated with section 7. On a straight line annual basis, these impacts are estimated to be between $270,000 and $594,000 per year in administrative costs and $6.1 million in project modifications. The actual costs are likely to vary unevenly from year to year, as fiscal and market conditions change, with some years receiving a greater share of the costs than others.

26. Based on the past consultation history, most of the technical assistance efforts, section 7 consultations, and project modifications presented in **Table ES-1** are likely to occur over the next 20 years, even if critical habitat is not designated. Specifically, section 7 activity for all land use activities except land development projects is likely to be associated with implementation of the section 7 provisions due to the listing of the species. Within the land development category, based on

the past consultation history, nearly $22.2 million of the $119.3 million in total consultation and project modification costs are expected to occur solely due to the designation of critical habitat. These costs are reported by county in **Table ES-2**. The next chapter of the analysis will provide a table of the species' habitat units proposed for each county.

## SOURCES OF UNCERTAINTY

27. The impacts estimated in this analysis are subject to several sources of uncertainty in the assumptions made about activities likely to take place in critical habitat and how these activities change after critical habitat designation. The effect of each uncertain variable on the analysis is described below in order of declining importance to the results:

- **Credits for Open Space or Other Development Requirements:** The analysis assumes that any preservation of habitat in a land development project, such as a specific plan for a part-residential and part-commercial project, is a land use restriction unrelated to requirements of any other land use regulatory authority, such as a city government. In other words, the assumption is that compensation required by the Service cannot be used by the developer in other project review processes to satisfy local conditions governing new development. This assumption will likely overestimate the cost impact of critical habitat designation, in that projects may receive credit for vernal pool preservation as a public use that would have been required by land dedication to parks or other open space corridors in the absence of any Endangered Species Act regulation. However, the magnitude of this overestimation requires detailed study of numerous local development approval processes and could not be addressed in this analysis.

- **Twenty Years of Urban Growth:** The analysis relies on multi-county growth models and specific area growth analysis in order to predict what land areas become urbanized over the next twenty years. However, the rate of this growth and its precise location are highly dependent on economic conditions, development trends, and the timing of planning processes and real estate transactions. Cities do not simply grow outward geographically, as development projects on undeveloped land require participating landowners, approvals from land use authorities, and sufficient demand for the product or they do not occur. These variables cannot be predicted for any future period of time, although some variables are likely to occupy a limited range of values in the next one to three years. It is not clear how the methods and growth models used in this analysis are likely to underestimate or overestimate the results.

**Table ES-2**
**U.S. Fish and Wildlife Service**
**Vernal Pools Species Critical Habitat Designation Economic Analysis**
**Portion of Land Development Costs Attributable to Critical Habitat [1]**

| ID | Region or County | Total Costs Attributable to Critical Habitat | Total Costs Attributable to Section 7 | | | |
|---|---|---|---|---|---|---|
| | | | Administration Costs | | Loss in Land Values | Total [2] |
| | | | *Low* | *High* | | |
| | **San Francisco Bay Area** | | | | | |
| 1 | Alameda | **$5,060,600** | $131,100 | $283,600 | $5,415,500 | **$5,622,900** |
| 2 | Contra Costa | **$1,100** | $0 | $100 | $1,100 | **$1,200** |
| 3 | Napa | **$0** | $20,300 | $44,000 | $892,000 | **$924,200** |
| 4 | Solano | **$17,094,900** | $460,100 | $995,500 | $38,124,200 | **$38,852,000** |
| | **Subtotal** | **$22,156,600** | **$611,500** | **$1,323,200** | **$44,432,800** | **$45,400,300** |
| | **San Joaquin Valley Region** | | | | | |
| 5 | Fresno | **$0** | $400 | $900 | $5,700 | **$6,400** |
| 6 | Kings | **$0** | $600 | $1,200 | $7,000 | **$7,900** |
| 7 | Madera | **$0** | $24,300 | $52,700 | $266,100 | **$304,600** |
| 8 | Merced | **$0** | $33,300 | $72,200 | $10,287,500 | **$10,340,300** |
| 9 | San Joaquin | **$0** | $0 | $0 | $0 | **$0** |
| 10 | Stanislaus | **$0** | $0 | $0 | $0 | **$0** |
| 11 | Tulare | **$0** | $13,700 | $29,600 | $169,200 | **$190,900** |
| | **Subtotal** | **$0** | **$72,300** | **$156,600** | **$10,735,500** | **$10,850,100** |
| | **Mountain Region** | | | | | |
| 12 | Lassen | **$0** | $0 | $0 | $0 | **$0** |
| 13 | Modoc | **$0** | $0 | $0 | $0 | **$0** |
| 14 | Plumas | **$0** | $43,000 | $93,000 | $518,300 | **$586,300** |
| 15 | Siskiyou | **$0** | $0 | $0 | $0 | **$0** |
| | **Subtotal** | **$0** | **$43,000** | **$93,000** | **$518,300** | **$586,300** |
| | **Upper Sacramento Valley Region** | | | | | |
| 16 | Butte | **$0** | $43,900 | $95,000 | $7,550,800 | **$7,620,300** |
| 17 | Colusa | **$0** | $63,200 | $136,700 | $15,162,700 | **$15,262,700** |
| 18 | Glenn | **$0** | $0 | $0 | $0 | **$0** |
| 19 | Shasta | **$0** | $174,700 | $377,900 | $2,892,700 | **$3,169,000** |
| 20 | Tehama | **$0** | $8,800 | $19,000 | $699,800 | **$713,700** |
| | **Subtotal** | **$0** | **$290,600** | **$628,600** | **$26,306,000** | **$26,765,700** |
| | **Sacramento Valley Region** | | | | | |
| 21 | Placer | **$0** | $185,900 | $402,200 | $5,450,700 | **$5,744,800** |
| 22 | Sacramento | **$0** | $85,200 | $184,300 | $19,516,800 | **$19,651,600** |
| 23 | Yolo | **$25,000** | $100 | $200 | $34,100 | **$34,300** |
| 24 | Yuba | **$0** | $0 | $0 | $0 | **$0** |
| | **Subtotal** | **$25,000** | **$271,200** | **$586,700** | **$25,001,600** | **$25,430,700** |
| | **Northern Coast Region** | | | | | |
| 25 | Lake | **$0** | $0 | $0 | $0 | **$0** |
| 26 | Mendocino | **$0** | $0 | $0 | $0 | **$0** |
| | **Subtotal** | **$0** | **$0** | **$0** | **$0** | **$0** |
| | **Central Coast Region** | | | | | |
| 27 | Monterey | **$0** | $58,600 | $126,800 | $2,790,100 | **$2,882,800** |
| 28 | San Luis Obispo | **$0** | $114,600 | $248,000 | $3,501,900 | **$3,683,200** |
| 29 | San Benito | **$0** | $0 | $0 | $0 | **$0** |
| | **Subtotal** | **$0** | **$173,200** | **$374,800** | **$6,292,000** | **$6,566,000** |

**Table ES-2**
**U.S. Fish and Wildlife Service**
**Vernal Pools Species Critical Habitat Designation Economic Analysis**
**Portion of Land Development Costs Attributable to Critical Habitat [1]**

| ID | Region or County | Total Costs Attributable to Critical Habitat | Total Costs Attributable to Section 7 | | | |
|---|---|---|---|---|---|---|
| | | | Administration Costs | | Loss in Land Values | Total [2] |
| | | | *Low* | *High* | | |
| | **Sierra Nevada Foothills Region** | | | | | |
| 30 | Amador | **$0** | $0 | $0 | $0 | **$0** |
| 31 | Calaveras | **$0** | $0 | $0 | $0 | **$0** |
| 32 | Mariposa | **$0** | $0 | $0 | $0 | **$0** |
| 33 | Tuolumne | **$0** | $0 | $0 | $0 | **$0** |
| | **Subtotal** | **$0** | **$0** | **$0** | **$0** | **$0** |
| | **Jackson County, Oregon** | | | | | |
| 34 | Jackson | **$0** | $91,300 | $197,500 | $1,746,200 | **$1,890,600** |
| | **Southern California** | | | | | |
| 35 | Riverside | **$0** | $306,400 | $663,000 | $1,380,400 | **$1,865,100** |
| 36 | Santa Barbara | **$0** | $0 | $0 | $0 | **$0** |
| 37 | Ventura | **$0** | $0 | $0 | $0 | **$0** |
| | **Subtotal** | **$0** | **$306,400** | **$663,000** | **$1,380,400** | **$1,865,100** |
| **37 COUNTY AREA GRAND TOTAL [3]** | | **$22,181,600** | **$1,839,700** | **$3,980,900** | **$116,412,800** | **$119,323,100** |
| **37 COUNTY AREA ANNUALIZED COST** | | **$1,109,100** | **$92,000** | **$199,000** | **$5,820,600** | **$5,966,200** |

*"CH_Portion"*

Sources: Table 10

[1] Outside of land development activities, there is not likely to be additional cost attributable solely to critical habitat designation.
[2] Reflects the average of the low and high range of consultation costs.
[3] Totals may not equal the sum of the county costs due to rounding.

- **Project Footprint and Vernal Pool Geometry:** Implicit in the assumptions about project modifications required of land developers is an average project geometry containing a fixed amount of wetted vernal pool acreage and, in some cases, a corresponding amount of vernal pool upland that must be kept intact to avoid adverse impacts to the listed species. In actual section 7 usage, these geophysical measurements differ for each project site and change the course of the consultation or technical assistance. It is not clear whether the average assumptions adopted by the analysis bias the results upwards or downwards, as examples can be found of a wide range of habitat impacts for the same size of project footprint.

- **Action Agency Uncertainty:** Numerous federal agencies that appear in the Service's consultation history of vernal pool species were asked about the likelihood of future consultations after critical habitat is designated. Biologists in the agencies were often familiar with vernal pool habitat but did not know what lands were destined for proposed designation by the Service, because the proposed rule had not yet been published in the Federal Register. Their answers to questions about likely regulatory impacts depend on their perceptions of the likely boundaries of the proposed critical habitat designation in relation to their perception of the extent of vernal pool habitat within areas likely to contain the agency's future project sites. Their answers also depend on their understanding of thresholds for consultations due to potential impacts to critical habitat. It is difficult to say whether agency personnel are likely to underestimate or overestimate these impacts.

- **Non-Residential Land Uses:** This analysis bases its project modification costs on prices paid for residential land uses, including one data series on home prices and another estimating the prices paid for entitled, developable land approved for residential construction. However, urbanization in a region typically includes other land uses besides residential, such as land approved for industrial, retail, or office construction. The entitled land values for these non-residential uses vary by region but are likely to be different from residential values. Depending on local market conditions for each of the 37 counties, the section 7 costs estimated in this analysis could overstate or understate actual costs.

- **Consultation History:** For many activities of the action agencies, the historical record on consultations and technical assistance contributed to the estimate of future consultations and project modifications to be performed by the agencies or third parties. However, this historical record has been strongly influenced by agency activities that may not be annually reoccuring, or that may not have shifted since the 1995-2001 time period that defines the consultation and technical assistance database obtained from the Service. For instance, Central Valley Project consultations that span dozens of entries in the historical record for San Joaquin Valley Counties do not themselves indicate a probable level of

future consultations with the Bureau of Reclamation. Where possible, action agency personnel elaborated on the specific project inventory likely to generate a federal nexus under section 7.

## SECTION 7 BENEFITS

28. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop [1978, 1980], Brookshire and Eubanks [1983], Boyle and Bishop [1986], Hageman [1985], Samples *et al.* [1986], Stoll and Johnson [1984]). Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran [1994] and Fausold and Lilieholm [1999]) both of which are associated with species conservation. Likewise, regional economies can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

29. The primary goal of the Act is to enhance the potential for species recovery. Thus, the benefits of actions taken under the Act are primarily measured in terms of the value the public places on species preservation (e.g., avoidance of extinction and/or an increase in a species' population). Such social welfare values may reflect both use and non-use (i.e., existence) values. For example, use values might include the potential for recreational use of a species, should recovery be achieved. Non-use values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist.

30. It is not feasible to fully describe and accurately quantify the benefits of this designation in the context of this economic analysis. The benefits discussed in this report are derived primarily from the listing of the species, based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act in general or critical habitat designation in particular. *Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking*.

## SUMMARY

31. **Tables ES-1** and **ES-2** provide a summary of the consultation and project modification costs associated with critical habitat designation for vernal pool species over a 20-year period and on a straight line annual basis. The costs are disaggregated by land use activity and the associated Federal action agency in **Table ES-1** and by county for all private land development activities in **Table ES-2**.

# I. INTRODUCTION AND BACKGROUND

32. In October 2002, the U.S. Fish and Wildlife Service (the Service) proposed designation of critical habitat for vernal pool species (consisting of 4 aquatic crustacean species and 11 plant species) on 1,663,442 acres west of the Sierra Nevada in 37 counties extending from Jackson County, Oregon in the north through Riverside County, California in the south.[2] The purpose of this report is to identify and analyze the potential economic effects that would result from this designation. This report was prepared by Economic & Planning Systems, Incorporated (EPS), under subcontract to Industrial Economics, Incorporated (IEc), under contract to the Service's Division of Economics.

33. Section 4(b)(2) of the Endangered Species Act (the Act) requires that the Service base the designation of critical habitat upon the best scientific and commercial data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas as critical habitat, provided the exclusion will not result in extinction of the species.

34. Under the listing of a species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to jeopardize the continued existence of the species. The Service defines jeopardy as any action that would appreciably reduce the likelihood of both the survival and recovery of the species. For designated critical habitat, section 7(a)(2) also requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or adverse modification of critical habitat. Adverse modification of critical habitat is currently construed as any direct or indirect alteration that appreciably diminishes the value of critical habitat for conservation of a listed species.

[2] Acreages shown throughout the report are different from those in the proposed rule dated September 24, 2002. The difference, which is caused by geographic information systems software spatial analysis estimation routines, is minor and generates a difference of no more than 0.04 percent of the total.

## 1.1 DESCRIPTION OF HABITAT AND SPECIES[3]

35. Vernal pool species live either in vernal pools, swales (shallow drainages that carry water seasonally), or other ephemeral freshwater habitats. Vernal pools are a subset of wetlands, characterized by seasonally specific timing and duration of inundation. These habitats form in regions with "Mediterranean" climates where shallow depressions fill with water during fall and winter rains and then evaporate in the spring. Downward percolation of standing water is prevented by the presence of an impervious subsurface layer, such as a claypan, hardpan, or volcanic stratum. The physical factors most important in determining the types and kinds of species found in vernal pools are:

- Pool size
- Depth
- Shape
- Water and soil chemistry
- Hydrology
- Soil type
- Geologic formation
- Landform

36. Vernal pools are usually clustered into interconnected systems of pools, swales, and uplands forming an interwoven matrix of uplands and wetlands called vernal pool complexes. Water remains in the pools and swales between a few days to a few months.

### 1.1.1 CRUSTACEAN SPECIES

37. Four vernal pool crustacean species are included in the proposed critical habitat designation. Three of the four (Conservancy fairy shrimp, longhorn fairy shrimp, and vernal pool tadpole shrimp) were federally listed as endangered and the fourth, the vernal pool fairy shrimp, was federally listed as threatened in 1994.

38. Tadpole shrimp (*Lepdurus packardi*) have dorsal compound eyes, a large shieldlike shell that covers most of their body, and a pair of long cercopods or appendanges at the end of the last abdominal segment. They live primarily at the bottoms of the pools, climbing or scrambling over objects, and plowing along bottom sediments as they forage for food. Their diet consists of organic detritus and living organisms, such as fairy shrimp and other invertebrates.

[3]Information on vernal pool species and their habitat is taken from the U.S. Fish and Wildlife Service, *Proposed Designation of Critical Habitat for Vernal Pool Species*, October XX, 2002 (66 FR 133).

39. In contrast to tadpole shrimp, all fairy shrimp have delicate elongated bodies, large stalked compound eyes, and 11 pairs of phyllopods, or gilllike structures that also serve as swimming legs. Fairy shrimp are filter feeders and consume algae, bacteria, protozoa, rotifers, and bits of detritus as they swim through the water on their backs.

40. Fertilized eggs of both species form a protective protein layer that allows the eggs to withstand heat, cold, and prolonged dehydration. These dormant eggs are known as cysts and they can remain viable in the soil for decades after deposition. Cysts may hatch within days after the vernal pools fill with water and the early stages of the fairy shrimp develop rapidly into adults.

41. Conservancy fairy shrimp (*Branchinecta conservatio*) look similar to other fairy shrimp species. Distinguishing characteristics include the male second antennae, used in clasping the female during copulation. The end segment of each second antenna is about 30 percent shorter than the basal segment, and has a 90 degree bend at the tip. Observations suggest this species is often found in pools that are relatively large and turbid. In general, the Conservancy fairy shrimp have very large populations within a given pool and are usually the most abundant fairy shrimp when more than one fairy shrimp species is present.

42. The longhorn fairy shrimp (*Branchinecta longiantenna*) are named for their relatively long second antennae and are extremely rare. Three disjunct locations along the eastern margin of the central coast range, from the vicinity of Livermore in Contra Costa County to Soda Lake in San Luis Obispo County, form the only known locations of the crustacean.

43. Vernal pool fairy shrimp (*Branchinecta lynchi*) are characterized by the presence of several bulges on the male's antenna and by the female's short pyriform, or pear shaped, brood pouch. Although the vernal pool fairy shrimp is distributed more widely than most other fairy shrimp species, it is generally uncommon throughout its range and rarely abundant where it does occur.

### 1.1.2 PLANT SPECIES

44. Eleven listed species of vernal pool plants are included in the proposed critical habitat designation. Succulent owl's clover (*Castillejoa campestris* spp. succulenta) is an annual whose distribution is primarily along the Southern Sierra foothills of Merced, Fresno, Madera, Stanislaus, and San Joaquin Counties. The plant displays yellow or orange petals and produces capsules with numerous brown, spindle shaped seeds. It was federally listed as threatened in 1997.

45. Hoover's spurge (*Chamaesyce hooveri*) grows close to the ground in the shape of gray-green mats 2 to 40 inches in diameter. It has small structures between each pair of leaves which resemble single flowers, but which are actually flower clusters, consisting of five male and one female flowers. The flowers themselves lack petals, but each flower cluster sits in a cuplike structure with small white

appendages that resemble petals. Tiny, white seeds are contained in a spherical capsule which extends on a stalk beyond the edge of the cup. Hoover's spurge was also federally listed as threatened in 1997.

46. Contra Costa goldfields (*Lasthenia conjugens*) is a member of the Aster family and is found most prominently in Solano County east and south of the City of Fairfield. The species is still extant throughout many other Bay/Delta region counties. Each flower head is yellow with tiny disk flowers in addition to 6 to 13 ray flowers. The plant is 4 to 12 inches tall and was federally listed as endangered in 1997.

47. Butte County meadowfoam (*Limnanthes floccosa* ssp. californica) has always been confined to Butte County and occurs primarily on intermediate fan terraces in annual grasslands with a landform characterized by small piles of soil. Stems are typically less than ten inches tall, and produce small, yellow-veined, white flower next to each upper leaf. Each of five pistils in the flower is capable of producing an egg-shaped nutlet 0.1 to 0.2 inches long. Butte County meadowfoam was federally listed as endangered throughout its range in 1992.

48. The remaining seven plant species are members of the grass family and of the Orcuttiae tribe. The Orcuttiae grasses are endemic to vernal pools and have several unusual characteristics. They sprout under water, producing both aquatic and terrestrial leaves as circumstances require, and they also exude an aromatic coating which likely helps to repel herbivores.

49. Colusa grass (*Neostapfia colusana*) has zigzag stems 4 to 12 inches tall and has the broadest ecological range among the seven grass species included in the proposed critical habitat designation. Existing populations are concentrated in Merced, Solano, Stanislaus, and Yolo counties. Flower parts in Colusa grass are enclosed in two fanshaped scales. The plant was federally listed as threatened in 1997.

50. Sacramento Orcutt grass (*Orcuttia californica var. viscida*) is densely tufted, bluish green, and covered with hairs. It grows on high terrace sites in acidic soils with an iron-silica hardpan. Sacramento Orcutt grass has always been restricted to Sacramento County and currently 70 percent of occupied habitat is located in a small area at a short distance from Mather Field. The plant was federally listed as endangered in 1997.

51. San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*) is found in Fresno, Merced, Madera, and Tulare counties and grows underwater for three months or more in vernal pools located on alluvial fans, tabletop lava flows, and stream terraces. The erect stems are 2 to 12 inches in length and have long hairs, giving them a grayish-green color. San Joaquin Valley Orcutt grass was federally listed as threatened in 1997.

52. Hairy Orcutt grass (*Orcuttia pilosa*) stems are two to eight inches tall and grow either erect or laying on the ground with the tips turned upward. The hairiness of the plant gives it a grayish appearance. The species is currently located in Glenn, Madera, and Tehama counties and prefers stream terraces and alluvial fans. It was federally listed as endangered in 1997.

53. Slender Orcutt grass (*Orcuttias tenuis*) grows in a variety of soil and vegetation types as a single stem or in small tufts of stems two to eight inches tall. The plant's inflorescence (or grouping of flower structures) typically makes up half of the plant's height. Slender Orcutt grass is found primarily in Tehama County, but occurences have also been reported in Lake, Lassen, Plumas, Shasta, Siskiyou, and Sacramento counties. It was federally listed as threatened in 1997.

54. Greene's tuctoria (*Tuctoria greenei*) grows in the Northern Basalt Flow, Northern Claypan, and Northern Hardpan types of vernal pools, typically at shallower depths than the six other grass species included in the critical habitat designation. It can be distinguished from those other species by the shape and arrangement of the scales enclosing flower parts, among other ways. In Central Valley counties the plant lives in grasslands, but in Shasta County the plant is surrounded by pine forests. It was federally listed as endangered in 1997.

55. Solano grass (*Tucturia mucronata*) has leaves 0.5 to 1.5 inches long that are rolled inward and have pointed tips. It appears grayish-green, hairy, and sticky, with stems that lay on the ground with tips turned upward. The species exists today only in Solano and Yolo counties in vernal pools with Northern Hardpan soil types. The plant was federally listed as endangered in 1978.

### 1.1.3 PRIMARY CONSTITUENT ELEMENTS

56. In identifying areas as critical habitat for vernal pool species, the Service considered those physical and biological habitat features which are essential to the conservation of the species. These essential features are referred to as the species' primary constituent elements (PCEs). Areas which do not contain any PCEs at the time of critical habitat designation are not considered critical habitat, whether or not they occur within a mapped critical habitat unit. The Service established PCEs for vernal pool crustacean species based on those habitat components essential for the primary biological needs of foraging, sheltering, reproduction, and dispersal.

57. Similarly, PCEs for the vernal pool plant species are based on those habitat components essential for the primary biological needs of germination, growth, reproduction, and dispersal. The PCEs established by the Service for each species tend to fall into two categories: 1) characteristics of areas such as vernal pools with seasonal periods of inundation and drying; and 2) characteristics of surrounding watersheds which maintain the hydrologic features of the seasonally inundated areas.

58. Because of limitations in Geographic Information Systems data, the Service did not exclude all developed areas, such as towns, housing developments, or other lands unlikely to contain the primary constituent elements essential for the conservation of vernal pool species. In addition, the fragmented and isolated nature of remaining vernal pool habitats prevent an easy grouping of the habitats into cohesive units without including some areas that do not contain the primary constituent elements. Existing features and structures within the boundaries of the mapped units, such as buildings, roads, most intensively farmed areas, etc., are unlikely to contain one or more of the primary constituent elements, and are therefore not considered critical habitat. As a result, Federal actions in those areas would not trigger section 7 consultation unless the actions affect the species or primary constituent elements in adjacent critical habitat.

## 1.2 PROPOSED CRITICAL HABITAT

59. Habitat units for the 11 plant species and 4 crustacean species are proposed for 36 counties in California and 1 county in Oregon. The total critical habitat acreage proposed for each species and the number of proposed habitat units for that species is shown in **Table 1**. Included in this table is also a shorthand abbreviation for each species taken from Service activity logs that will be used in later tables. Most species are associated with three to seven separate proposed habitat units. However, three shrimp species and two plant species have more than seven habitat units, and one plant species, Solano Grass, has only two proposed habitat units. The species with the greatest number of proposed habitat units is the vernal pool fairy shrimp, with 35 units and at least 1 unit in 27 of the 37 counties.

60. In total, there are 128 habitat units covering 1,663,442 acres, or 3 percent of the land area of the counties included in the proposed designation.

61. Because vernal pool species are often located together, many proposed critical habitat units overlap. Habitat units located partially or wholly within each county are shown in **Table 2**, and the total acres covered by at least one critical habitat unit is shown in comparison to the land area of the entire county. For example, the seven-county San Joaquin Valley Region (to be defined in the next section) contains nearly 716,000 acres of proposed habitat units and ranks first among the regions for total land area proposed for critical habitat. On the other hand, the Northern Coast Region, consisting of two counties with proposed habitat units, has only 6,800 acres of proposed critical habitat. Areas of overlap are only counted once, a necessary step that avoids an overestimation of these land areas.

62. The Service has labeled each species' habitat units by numbering them, starting with habitat unit 1. For example, because there are 15 species named in the proposed critical habitat designation, there are 15 habitat unit 1's. The habitat unit numbers generally increase moving from north to south. For the purposes of

**Table 1**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Summary of Species and Proposed Acreage**

| Species Common Name | Species Taxonomic Name | Abbreviation | Number of Proposed Units | Proposed Acres [1] |
|---|---|---|---|---|
| Succulent Owl's Clover | *Castilleja Campestris* Succulenta | CACAS | 8 | 309,406 |
| Conservancy Fairy Shrimp | *Branchinecta Conservatio* | CFYS | 8 | 409,735 |
| Hoover's Spurge | *Chamaesyce Hooveri* | CHHO | 7 | 201,986 |
| Contra Costa Goldfields | *Lasthenia Conjugens* | LACO | 9 | 38,298 |
| Longhorn Fairy Shrimp | *Branchinecta Longiantenna* | LFS | 3 | 100,334 |
| Butte County Meadowfoam | *Limnanthes Floccosa* Californica | LIFLC | 4 | 40,326 |
| Colusa Grass | *Neostapfia Colusana* | NECO | 7 | 327,668 |
| San Joaquin Valley Orcutt Grass | *Orcutta Inaequalis* | ORIN | 6 | 249,715 |
| Hairy Orcutt Grass | *Orcutta Pilosa* | ORPI | 6 | 162,271 |
| Slender Orcutt Grass | *Orcutta Tenuis* | ORTE | 6 | 175,522 |
| Sacramento Orcutt Grass | *Orcutta Viscida* | ORVI | 3 | 60,864 |
| Greene's Tuctoria | *Tuctoria Greenei* | TUGR | 8 | 353,308 |
| Solano Grass | *Tuctoria Mucronata* | TUMU | 2 | 18,149 |
| Vernal Pool Fairy Shrimp | *Branchinecta Lynchi* | VPFS | 35 | 1,130,606 |
| Vernal Pool Tadpole Shrimp | *Lepidurus Packardi* | VPTS | 18 | 719,965 |

*"species_summary"*

Source: U.S. Fish and Wildlife Service, Proposed Designation of Critical Habitat for Vernal Pools Species, September 24, 2002, (66 FR 133); U.S. Fish and Wildlife Service data.

[1] The sum of all 15 species' proposed critical habitat acreage does not equal the total acres designated for critical habitat. Some habitat units overlap each other.

**Table 2**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Summary of Habitat Units by County**

| ID | Region or County | Proposed Habitat Units [1] | | | Total Acreage In Proposed Units [2] | Total Acreage In County |
|---|---|---|---|---|---|---|
| | **San Francisco Bay Area** | | | | | |
| 1 | Alameda | LFS 1<br>LACO 8 | VPFS 19 | VPTS 14 | 3,187 | 472,000 |
| 2 | Contra Costa | LFS 1 | VPFS 19 | LACO 6, 7 | 7,630 | 460,980 |
| 3 | Napa | VPFS 17 | LACO 2, 3 | | 3,229 | 482,470 |
| 4 | Solano | CFYS 3,4<br>NECO 2 | VPFS 15, 16<br>LACO 4, 5 | VPTS 11, 12<br>TUMU 2 | 95,958 | 530,030 |
| | **Subtotal** | | | | **110,004** | **1,945,480** |
| | **San Joaquin Valley Region** | | | | | |
| 5 | Fresno | VPFS 24<br>CACAS 5, 6 | VPTS 17 | ORIN 4, 5 | 36,014 | 3,816,450 |
| 6 | Kings | VPFS 26 | | | 834 | 889,270 |
| 7 | Madera | CFYS 7<br>NECO 7<br>CHHO 6 | VPFS 24, 25<br>TUGR 7, 8<br>ORIN 2, 3, 5 | VPTS 16<br>ORPI 5, 6<br>CACAS 4, 6 | 112,456 | 1,368,590 |
| 8 | Merced | CFYS 6, 7<br>VPTS 13, 15, 16<br>ORPI 4<br>CACAS 3 | VPFS 21, 22, 23<br>NECO 5, 6, 7<br>CHHO 5, 6 | LFS 2<br>TUGR 7<br>ORIN 1, 2 | 337,449 | 1,234,490 |
| 9 | San Joaquin | VPFS 18 | VPTS 9 | CACAS 1 | 19,903 | 895,640 |
| 10 | Stainislaus | CFYS 5, 7<br>VPTS 13, 16<br>ORPI 4 | LFS 2<br>NECO 3, 4, 5, 7<br>CHHO 4, 5, 6 | VPFS 20, 21<br>TUGR 6<br>CACAS 2 | 154,914 | 956,520 |
| 11 | Tulare | VPFS 26, 27<br>ORIN 6 | VPTS 18 | CHHO 7 | 54,242 | 3,087,570 |
| | **Subtotal** | | | | **715,812** | **12,248,530** |
| | **Mountain Region** | | | | | |
| 12 | Lassen | TUGR 1 | ORTE 1 | | 23,719 | 2,916,790 |
| 13 | Modoc | ORTE 1 | | | 2,413 | 2,524,390 |
| 14 | Plumas | ORTE 1 | | | 1,287 | 1,634,540 |
| 15 | Siskiyou | ORTE 1 | | | 5,728 | 4,023,850 |
| | **Subtotal** | | | | **33,147** | **11,099,570** |

**Table 2**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Summary of Habitat Units by County**

| ID | Region or County | Proposed Habitat Units [1] | | | Total Acreage In Proposed Units [2] | Total Acreage In County |
|---|---|---|---|---|---|---|
| | **Upper Sacramento Valley Region** | | | | | |
| 16 | Butte | CFYS 1<br>LIFLC 1, 2, 3, 4<br>CHHO 1, 2 | VPFS 7, 9<br>TUGR 2, 3, 4<br>ORTE 4 | VPTS 3, 4<br>ORPI 1, 2 | 69,716 | 1,049,340 |
| 17 | Colusa | CFYS 2<br>TUGR 5 | VPFS 10<br>ORPI 3 | VPTS 5, 6<br>CHHO 3 | 5,038 | 736,500 |
| 18 | Glenn | CFYS 2<br>TUGR 5 | VPFS 10<br>ORPI 3 | VPTS 5, 6<br>CHHO 3 | 10,687 | 841,530 |
| 19 | Shasta | VPFS 5<br>ORTE 1, 2, 3 | VPTS 1, 2 | TUGR 1 | 40,352 | 2,422,820 |
| 20 | Tehama | CFYS 1<br>LIFLC 1<br>CHHO 1 | VPFS 6, 7, 8<br>TUGR 2<br>ORTE 3, 4 | VPTS 2, 3<br>ORPI 1 | 147,568 | 1,888,670 |
| | **Subtotal** | | | | **273,361** | **6,938,860** |
| | **Sacramento Valley Region** | | | | | |
| 21 | Placer | VPFS 11,12 | VPTS 7 | | 47,754 | 612,900 |
| 22 | Sacramento | VPFS 13, 14<br>ORTE 6 | VPTS 8<br>CACAS 1 | ORVI 1, 2, 3 | 105,681 | 618,040 |
| 23 | Yolo | VPTS 10 | NECO 1 | TUMU 1 | 474 | 647,960 |
| 24 | Yuba | VPFS 11 | VPTS 4, 7 | | 7,046 | 403,490 |
| | **Subtotal** | | | | **160,955** | **2,282,390** |
| | **Northern Coast Region** | | | | | |
| 25 | Lake | ORTE 5 | | | 4,189 | 805,420 |
| 26 | Mendocino | LACO 1 | | | 2,635 | 2,245,940 |
| | **Subtotal** | | | | **6,824** | **3,051,360** |
| | **Central Coast Region** | | | | | |
| 27 | Monterey | VPFS 28, 29 | LACO 9 | | 77,907 | 2,126,040 |
| 28 | San Luis Obispo | LFS 3 | VPFS 29, 30 | | 85,247 | 2,114,880 |
| 29 | San Benito | VPFS 28 | | | 91,291 | 889,050 |
| | **Subtotal** | | | | **254,445** | **5,129,970** |

**Table 2**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Summary of Habitat Units by County**

| ID | Region or County | Proposed Habitat Units [1] | | | Total Acreage In Proposed Units [2] | Total Acreage In County |
|---|---|---|---|---|---|---|
| | **Sierra Nevada Foothills Region** | | | | | |
| 30 | Amador | VPTS 9 | ORVI 3 | | 3,407 | 379,240 |
| 31 | Calaveras | | | | 100 | 652,920 |
| 32 | Mariposa | CFYS 6<br>NECO 6 | VPFS 22<br>TUGR 7 | VPTS 13, 15<br>ORIN 1, 2 | 17,986 | 928,780 |
| 33 | Tuolumne | VPTS 13<br>CHHO 4 | NECO 4<br>CACAS 2 | TUGR 6 | 2,313 | 1,430,820 |
| | **Subtotal** | | | | **23,806** | **3,391,760** |
| | **Jackson County, Oregon** | | | | | |
| 34 | Jackson | VPFS 1, 2, 3, 4 | | | 7,621 | 1,792,647 |
| | **Southern California** | | | | | |
| 35 | Riverside | VPFS 33, 34, 35 | | | 10,209 | 4,613,220 |
| 36 | Santa Barbara | VPFS 31 | | | 20,746 | 1,725,620 |
| 37 | Ventura | CFYS 8 | VPFS 32 | | 46,512 | 1,181,410 |
| | **Subtotal** | | | | **77,467** | **7,520,250** |
| | **GRAND TOTAL** | | | | **1,663,442** | **55,400,817** |

*"habitat_summary"*

Source: U.S. Fish and Wildlife Service, Proposed Designation of Critical Habitat for Vernal Pools Species, September 2002 (66 FR 133).

[1] The habitat units for each species are numbered starting with unit 1. Each habitat unit is designated for a single species. The common names for the species can be found in Table 1.

[2] Equals the non-overlaying acreage for all habitat units in each county. The total acreage amount is different from that shown in the proposed rule dated September 24, 2002. The difference, which is caused by Geographic Information Systems software spatial analysis estimation routines, is minor and less than 0.04% of the total.

this analysis, the 37 counties have been grouped into ten regions. Descriptions of the 15 species' proposed critical habitat units by region are provided after the regional groupings of the counties are explained.

63. California includes a diverse array of cities, counties, and regions. Counties can be divided into regions in a number of ways. The division of counties into the regions described below follows Association of Government organizations in some cases, and the regional divisions used by W. Fulton in his *Guide to California Planning*, Second Edition, 1999. Regions with counties having no proposed critical habitat are excluded, as are counties on the periphery of regions if no habitat units have been proposed in them.

- **San Francisco Bay Area**: The San Francisco Bay Area, as defined by the Association of Bay Area Governments, includes nine counties: Sonoma, Marin, Napa, Solano, Alameda, Contra Costa, San Francisco, San Mateo, and Santa Clara. Four counties – Napa, Solano, Alameda, and Contra Costa – include proposed critical habitat units.

- **San Joaquin Valley**: The San Joaquin Valley Region includes eight counties: Fresno, Kern, Kings, Madera, Merced, Tulare, San Joaquin, and Stanislaus. All but Kern have proposed critical habitat units.

- **Mountain:** The Mountain Region includes six counties: Lassen, Modoc, Nevada, Plumas, Sierra, and Siskiyou. All counties except for Nevada and Sierra include proposed critical habitat units.

- **Upper Sacramento Valley:** The Upper Sacramento Valley Region includes five counties: Butte, Colusa, Glenn, Shasta, and Tehama. All five include proposed critical habitat units.

- **Sacramento Valley:** The Sacramento Valley Region, as defined by the Sacramento Area Council of Governments, includes six counties: Sacramento, Yolo, Sutter, Yuba, Placer, and El Dorado. Placer, Sacramento, Yuba, and Yolo all include proposed critical habitat units.

- **North Coast**: The North Coast Region includes five counties: Del Norte, Humboldt, Lake, Mendocino, and Trinity. Only Mendocino and Lake include proposed critical habitat units.

- **Central Coast**: The Central Coast Region includes four counties: Santa Barbara, San Luis Obispo, Monterey, and Santa Cruz. All except Santa Cruz include proposed critical habitat units.

- **Sierra Nevada Foothills**: The Sierra Nevada Foothills Region includes four counties: Amador, Calaveras, Mariposa, and Tuolumne. All include proposed critical habitat units.

- **Jackson County, Oregon**: This Southern Oregon county has several proposed critical habitat units and lies to the north of Siskiyou County, California.

- **Southern California**: Southern California, for the purposes of this analysis, includes eight counties: San Diego, Imperial, Riverside, San Bernardino, Orange, Los Angeles, Ventura, and Santa Barbara. Only Riverside, Ventura, and Santa Barbara have proposed critical habitat units.

### 1.2.1 UNITS IN THE SAN FRANCISCO BAY REGION

64. This region contains 19 proposed habitat units for seven species. One longhorn fairy shrimp unit, four vernal pool fairy shrimp units, three vernal pool tadpole shrimp units, seven Contra Costa goldfields units, two Conservancy fairy shrimp units, one Colusa grass unit, and one Solano grass unit are proposed on 110,004 acres in the four counties. The longhorn fairy shrimp unit is the Altamont Hills Unit. The vernal pool fairy shrimp units include the Vacaville Unit, the Jepson Prairie Unit, the Napa River Unit, and the Altamont Hills Unit. Combined, the proposed critical habitat acreage represents 5.7 percent of the region's land area.

### 1.2.2 UNITS IN THE SAN JOAQUIN VALLEY REGION

65. This region contains 46 proposed habitat units for ten species. Nine vernal pool fairy shrimp units, six vernal pool tadpole shrimp units, six San Joaquin Valley Orcutt grass units, six succulent owl's clover units, three Conservancy fairy shrimp units, five Colusa grass units, three Greene's tuctoria units, three hairy Orcutt grass units, four Hoover's spurge units, and two longhorn fairy shrimp units are proposed on 715,812 acres in the seven counties.

66. The vernal pool fairy shrimp units are the San Joaquin Unit, the Caswell Unit, the Stanislaus unit, the Merced Unit, the Grassland Ecological Unit, the Madera Unit, the Kennedy Table Unit, the Cross Creek Unit, and the Pixley Unit. The vernal pool tadpole shrimp units include the Consumnes Unit, the Stanislaus Unit, the Merced Unit, the Grassland Ecological Unit, the Table Mountain Unit, and the Tulare Unit. The San Joaquin Valley Orcutt units are the Merced Unit, the Le Grand Unit, the Madera Unit, the Fresno Unit, the Table Mountain Unit, and the Tulare Unit. The succulent owl's clover units include the Southeast Sacramento Valley Unit, the Waterford Unit, the Merced Unit, the Madera Unit, the Fresno Unit, and the Table Mountain Unit. The Conservancy fairy shrimp units are the Northern San Joaquin Valley Unit, the Merced Unit, and the Grassland Ecological Unit.

67. The Colusa grass units include the Farmington Unit, the Waterford Unit, the Turlock Unit, the Merced Unit, and the Grassland Ecological Unit. The Greene's tuctoria units are the Waterford Unit, the Merced Unit, and the Madera Unit. The hairy Orcutt grass units include the Turlock Unit, the Madera Unit, and the Cottonwood Creek Unit. The Hoover's spurge units include the Waterford Unit,

the Turlock Unit, the Grasslands Unit, and the Tulare Unit. The longhorn fairy shrimp unit is the Grassland Ecological Unit. Combined, the proposed critical habitat acreage represents 5.8 percent of the region's land area.

### 1.2.3 UNITS IN THE MOUNTAIN REGION

68. This region contains two proposed habitat units for two species. One Greene's tuctoria unit and one slender Orcutt grass unit is proposed on 33,147 acres in the four counties. The Greene's tuctoria unit is called the Modoc Plateau Unit and the slender Orcutt grass unit is also called the Modoc Plateau Unit. Combined, the proposed critical habitat acreage represents 0.3 percent of the region's land area.

### 1.2.4 UNITS IN THE UPPER SACRAMENTO VALLEY REGION

69. This region contains 33 proposed habitat units for eight species. Two Conservancy fairy shrimp units, six vernal pool fairy shrimp units, five vernal pool tadpole shrimp units, four Butte County meadow foam units, five Greene's tuctoria units, three hairy Orcutt grass units, three Hoover's spurge units, and two slender Orcutt grass units are proposed on 273,361 acres in the five counties. The Conservancy fairy shrimp units are known as the Vina Plains Unit and the Colusa Unit. The vernal pool fairy shrimp units are known as the Redding Unit, the Red Bluff Unit, the Vina Plains Unit, the Orland Unit, the Oroville Unit, and the Sacramento National Wildlife Refuge Unit. The vernal pool tadpole shrimp units include the Vina Plains Unit, the Oroville Unit, the Sacramento National Wildlife Refuge Unit, the Dolan Unit, and the Suisun Marsh Area Unit.

70. The Butte County meadowfoam units are the Rock Creek Unit, the Chico Unit, the Doe Mill Unit, and the Oroville Unit. The Greene's tuctoria units include the Modoc Plateau Unit, the Vina Unit, the Butte Unit, the Richvale Unit, and the Sacramento National Wildlife Refuge Unit. The hairy Orcutt grass units are the Vina Plains Unit, the Butte Unit, and the Sacramento Refuge Unit. The Hoover's spurge units are the Vina Plains Unit, the Butte Unit, and the Sacramento National Wildlife Refuge Unit as well. Finally, the slender Orcutt grass units include the Inskip Hill Unit and the Vina Plains Unit. Combined, the proposed critical habitat acreage represents 3.9 percent of the region's land area.

### 1.2.5 UNITS IN THE SACRAMENTO VALLEY REGION

71. This region contains 15 proposed habitat units for seven species. Four vernal pool fairy shrimp units, four vernal pool tadpole shrimp units, three Sacramento Orcutt grass units, and one unit each of slender Orcutt grass, succulent owl's clover, Colusa grass, and Solano grass are proposed on 160,955 acres in the four counties. The vernal pool fairy shrimp units include the Beale Unit, the Western Placer County Unit, the Mather Unit, and the Consumnes Unit. The vernal pool tadpole shrimp units are the Oroville Unit, the Beale Unit, the Mather Unit, and the Davis Communications Annex Unit. The Sacramento Orcutt grass units include the Phoenix Field and Phoenix Park Unit, the Southeast Sacramento Valley Unit, and the Rancho Seco Unit. The slender Orcutt grass unit and the

succulent owl's clover unit are both called the Southeast Sacramento Valley Unit, the Colusa grass unit and the Solano grass units are both called the Davis Communications Annex and Grasslands Area Unit. The proposed critical habitat acreage represents 7.1 percent of the region's land area.

### 1.2.6 UNITS IN THE NORTHERN COAST REGION

72. This region contains two proposed habitat units for two species. One slender Orcutt grass unit and one Contra Costa goldfields unit are proposed on 6,824 acres in the two counties. The slender Orcutt grass unit is known as the Bogg's Lake Unit, and the Contra Costa goldfields unit is known as the Manchester Unit. Combined, the proposed critical habitat acreage represents 0.2 percent of the region's land area.

### 1.2.7 UNITS IN THE CENTRAL COAST REGION

73. This region contains five proposed habitat units for three species. Three vernal pool fairy shrimp units, one Contra Costa goldfields unit, and one longhorn fairy shrimp unit are proposed on 254,445 acres in three counties. The vernal pool fairy shrimp units consist of the San Benito County Unit, the Central Costal Ranges Unit, and the Carrizo Plain Unit. The Contra Costa goldfields unit is called the Fort Ord Unit, and the longhorn fairy shrimp unit is called the Carrizo Plain Unit. The proposed critical habitat acreage represents 5.0 percent of the region's land area.

### 1.2.8 UNITS IN THE SIERRA NEVADA REGION

74. This region contains 14 proposed habitat units for nine species. Three vernal pool tadpole shrimp units, one Sacramento Orcutt grass unit, one Conservancy fairy shrimp unit, one vernal pool fairy shrimp unit, two Colusa grass units, two Greene's tuctoria units, two San Joaquin Valley Orcutt grass units, one Hoover's spurge unit, and one succulent owl's clover unit are proposed on 23,806 acres in the four counties. The vernal pool tadpole shrimp units are the Consumnes Unit, the Stanislaus Unit, and the Merced Unit. The Sacramento Orcutt grass unit is the Rancho Seco Unit, and the Conservancy fairy shrimp unit and the vernal pool fairy shrimp units are both called the Merced Unit. Both the Colusa grass units and the Greene's tuctoria units are called Waterford Unit and the Merced Unit. The San Joaquin Valley Orcutt grass units are the Merced Unit and the Le Grand Unit. Finally, the Hoover's spurge unit and the succulent owl's clover units are both called the Waterford Unit. Combined, the proposed critical habitat acreage represents 0.7 percent of the region's land area.

### 1.2.9 UNITS IN JACKSON COUNTY, OREGON

75. This county contains four proposed habitat units for one species only. Four vernal pool fairy shrimp units are proposed on 7,621 acres in Jackson County. The units include the North Agate Desert Unit, the White City East Unit, the White City West Unit, and the Table Rocks Unit. The proposed critical habitat acreage represents 0.4 percent of the county's land area.

### 1.2.10 UNITS IN SOUTHERN CALIFORNIA

76. This region contains six proposed habitat units for two species. One Conservancy fairy shrimp unit and five vernal pool fairy shrimp units are proposed on 77,467 acres in three counties. For the vernal pool fairy shrimp, the units are the Lake Cachuma Area Unit, the Ventura County Unit, the Hemet-San Jacinto Unit, the Santa Rosa Plateau Unit, and the Skunk Hollow Unit. The unit for the Conservancy fairy shrimp is the Ventura County Unit. The proposed critical habitat acreage represents 1.0 percent of the region's land area.

## 1.3 FRAMEWORK FOR ANALYSIS

77. The focus of this economic analysis is on section 7 of the Act, which requires Federal agencies to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. Federal agencies are required to consult with the Service whenever they propose an action that may affect a listed species or its designated critical habitat. Aside from the protection that is provided under section 7, the Act does not provide other forms of protection to lands designated as critical habitat. Because consultation under section 7 only applies to activities that are carried out, permitted, or funded by Federal agencies, the designation of critical habitat will not afford any additional protections for species with respect to strictly private activities.

78. This analysis first identifies land use activities within or in the vicinity of those areas being proposed for critical habitat that are likely to be affected by section 7 of the Act. To do this, the analysis evaluates a "without section 7" scenario and compares it to a "with section 7" scenario. The "without section 7" scenario constitutes the baseline of this analysis. It represents the level of protection that would be afforded the species under the Act if section 7 protective measure were absent. This level of protection would include other Federal, State, and local laws. The "with section 7" scenario identifies land-use activities likely to involve a Federal nexus that may affect the species or its designated critical habitat, which accordingly have the potential to be subject to future consultations under section 7 of the Act.

79. Economic activities identified as likely to be affected under section 7 and the resulting impacts that section 7 can have on such activities constitute the upper-bound estimate of the proposed critical habitat economic analysis. By

defining the upper-bound estimate to include both jeopardy and adverse modification impacts, the analysis recognizes the difficulty in sometimes differentiating between the two in evaluating only the critical habitat effects associated with the proposed rulemaking. This step is adopted in order to ensure that any critical habitat impacts that may occur co-extensively with the listing of the species (e.g., jeopardy, adverse modification, or destruction) are not overlooked in the analysis.

80. Upon identifying section 7 impacts, the analysis proceeds to consider the subset of impacts that can be attributed exclusively to the critical habitat designation. To do this, the analysis adopts a "with and without critical habitat approach." This approach is used to determine those effects found in the upper-bound estimate that may be attributed solely to the proposed designation of critical habitat. Specifically, the "with and without critical habitat" approach considers section 7 impacts that will likely be associated with the implementation of the jeopardy provisions of section 7 and those that will likely be associated with the implementation of the adverse modification provision of section 7. In many cases, impacts associated with the jeopardy standard remain unaffected by the designation of critical habitat and thus would not normally be considered an effect of a critical habitat rulemaking. The subset of section 7 impacts likely to be affected solely by the designation of critical habitat represent the lower-bound estimate of this analysis.

81. The critical habitat designation for vernal pool species encompasses land under private, city, county, state, and Federal ownership. For private, city, county, and state lands subject to critical habitat designation, section 7 consultations and modifications to land uses and activities can only be required when a Federal nexus, or connection, exists. A Federal nexus arises if the activity or land use of concern involves Federal permits, Federal funding, or another form of Federal action that involves discretionary control or exercise of authority. Section 7 consultations are not required for activities on non-Federal lands that do not involve a Federal nexus.

82. In addition to lands contained within the proposed critical habitat designation, this report will examine adjacent activities sponsored or permitted by Federal agencies that may affect vernal pool species and/or adversely modify the proposed critical habitat.

83. This report estimates impacts of listing and critical habitat designation on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Accordingly, the analysis bases estimates on activities that are likely to occur within a 20-year time horizon.

84. Twenty years is an appropriate time frame for this analysis for several reasons. First, the land use model chosen for this economic analysis provides mapping output for 1998 and 2020. As an approximation of baseline conditions, the 1998 output describes land that is already urbanized in 20 counties.

Additional land developed by 2020 provides a good foundation for estimating consultation requirements between the Service and the Army Corps of Engineers (ACOE) in these counties, as described in Section 4.3.1. The acreage transformed from agricultural or undeveloped uses into urban uses between 1998 and 2020 (as projected by the model) is not significantly different than an estimate of newly urbanized acreage between 2003 and 2023 and errs on the conservative side.

85. Second, the scale of the proposed critical habitat designation requires the use of regional and county level growth data. In the State of California, this data is readily available beyond the ten year horizon. A 20-year timeframe is very common among a number of planning and development tools including: California state-mandated jurisdictional General Plans, population and employment projections by regional associations of governments, and project planning and the calculation of absorption rates and financial rates of return by real estate developers. If the proposed critical habitat designation had been restricted to a handful of local, single-county sites, this data would not have been useful and a shorter interval period, perhaps ten years, would have been more appropriate.

86. Additionally, speculative real estate transactions in high growth communities in the Central Valley, for instance, frequently occur involving land not yet annexed into cities and land upon which development is not likely to occur for 15 to 20 years. Master planned communities consisting of hundreds, if not thousands, of acres of raw land increasingly require more than ten years to receive planning approvals from local, state and Federal agencies. Certain land development interests that precede the ownership by the eventual land developer, therefore, often financially control property more than a decade in advance of the first project application. Farming or ranching may continue, but critical habitat designation has the potential to affect development potential and associated speculative land value at a very early stage in the development process. Changes in these land values are a major focus of this analysis and establish the value of a 20-year interval for growth impacts.

## 1.4 METHODOLOGICAL APPROACH

87. This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts of designation. The methodology consists of:

- Determining the current and projected economic activity within and around the proposed critical habitat area;

- Considering how current and future activities that take place or will likely take place on Federal and private land could adversely affect proposed critical habitat;

- Identifying whether such activities taking place on privately-owned property within the proposed critical habitat boundaries are likely to involve a Federal nexus;

- Evaluating the likelihood that identified Federal actions and non-Federal actions having a Federal nexus will require consultations under section 7 of the Act and, in turn, that such consultations will result in modifications to projects;

- Estimating per-unit costs of expected section 7 consultations, project modifications and other economic impacts associated with activities in or adjacent to areas proposed as critical habitat;

- Estimating the upper bound of total costs associated with the area proposed for the designation (including costs that may be attributed co-extensively with the listing of the species) and the lower bound of costs (i.e., costs attributable solely to critical habitat);

- Determining the benefits that may be associated with the designation of critical habitat; and,

- Assessing the extent to which critical habitat designation will create costs for small businesses and/or affect property values as a result of modifications or delays to projects.

## 1.5 INFORMATION SOURCES

88. The methodology outlined above relies on input and information supplied by staff from the Service, the Department of Defense (DOD), the Federal Aviation Administration (FAA), the Federal Highway Administration (FHWA) and its state counterpart Caltrans, the Environmental Protection Agency (EPA), the Bureau of Reclamation (BoR), the Bureau of Indian Affairs (BIA), the U.S. Forest Service (USFS), the Federal Energy Regulatory Commission (FERC), the Western Area Power Administration (WAPA), the Army Corps of Engineers (ACOE), the Federal Railroad Administration (FRRA), and the Federal Transit Administration (FTA).

89. Land value modeling information was obtained from RAND California, the Institute of Urban and Regional Development at the University of California, Berkeley, the Sacramento Area Council of Governments, the Association of Bay Area Governments, the Southern California Association of Governments, the California State Department of Finance, and numerous city and county planning departments.

90. Comments and information on land uses and the effects of critical habitat designation were not available from private landowners during the preparation of this analysis, so this analysis uses information from the possible action agencies regarding activities occurring on the private land and the likelihood of Federal

nexuses being associated with these activities. An addendum to this analysis will be written after public comment is received, and the addendum will incorporate both agency and private landowner information.

# II. RELEVANT BASELINE INFORMATION

91. This section provides relevant information about regulatory elements that exist in the baseline, i.e., the "without section 7" scenario. Independent of Federal listing actions for vernal pool species and the proposed designation of critical habitat, both Federal and state governments regulate activities with the potential to modify vernal pool habitat. Various types of land use activities are impacted by the implementation of these regulations. The costs of these impacts will not be included in the "with section 7" cost estimate, as they would occur independently of listing and critical habitat designation.

92. Two regulatory programs, one administered by the Army Corps of Engineers and the other required of "lead" agencies at the state or local level by California law, are major components of land use regulation with direct bearing on vernal pool species habitat. In contrast, Oregon land use law at the state level does not address habitat resource impacts as they are concerned with endangered species. Local Oregon jurisdictions may require project proponents to address these impacts, but the authority cannot be generalized to the areas where critical habitat has been proposed.

## 2.1 REGULATION OF WETLANDS BY THE ARMY CORPS OF ENGINEERS (ACOE)

93. Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Activities in waters of the United States that are generally regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry.

94. The basic premise of the program is that no discharge of dredged or fill material can be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded. Land development projects planned in wetland areas require permits from the ACOE under Clean Water Act section 404. When land developers apply for a permit, they must show that they have taken steps to avoid wetland impacts where practicable, that they have minimized potential impacts to wetlands, and that they have provided compensation for any remaining, unavoidable impacts through activities to restore or create wetlands.

95. Regulated activities are controlled by a permit review process. An individual permit is usually required for potentially significant impacts. However, for discharges that will have only minimal adverse effects, the ACOE has the ability to authorize discharge through up-front general permits. These may be issued on a nationwide, regional, or state basis for particular categories of activities (for

example, minor road crossings, utility line backfill, and bedding) as a means to expedite the permitting process. Section 404(f) exempts some activities from regulation under Section 404, including many ongoing farming, ranching, and silvicultural practices.

### 2.1.1 LEAST DAMAGING ALTERNATIVES ANALYSIS FOR LAND DEVELOPMENT PROJECTS

96. Most land development projects are too large to qualify for authorization under a general permit issued by the ACOE, making the project's determination of whether a practicable alternative exists that is less damaging to the aquatic environment a mandatory analysis. In practical terms, meetings are held between the project proponent and ACOE officials to negotiate conditions that allow the project to fill or modify wetlands. The outcome of these meetings and the alternatives analysis is that the project must implement a combination of one or more measures to receive the 404 permit: wetlands avoidance, off-site preservation, or on- or off-site wetlands creation.

97. Avoidance, also called *on-site preservation* or *land set aside*, refers to the act of leaving wetlands in a natural state where they occur on the project site. Off-site preservation is a mechanism to protect wetlands in a location removed from the project site, either through purchasing land in conservation banks that sell protected natural wetland areas as a business or through purchasing qualified land owned by someone who has natural wetlands and is willing to sell a portion of the property or a conservation easement. A third mechanism, *wetlands restoration or creation*, can mean that a land developer will set aside a qualified amount of land on-site that is suitable for the restoration or construction of functioning wetlands, purchase and manage suitable relic vernal pool habitat off-site and restore wetlands there, or purchase restored or created wetlands and the necessary stewardship services through a conservation bank located off-site.

98. To date, the Sacramento District of the ACOE has had the most extensive experience in issuing 404 permits for projects with vernal pool impacts. The total amount of acres avoided or mitigated (either preserved off-site or created on- or off-site) has depended on the nature of the development project and the physical characteristics of the project site. Each project presents unique challenges to development and wetlands functioning, and a unique set of avoidance and mitigation techniques is required to implement the least damaging practicable project alternative.

99. Overall, ACOE officials believe that the agency has achieved a minimum of one acre mitigated for each acre of vernal pool wetlands filled. This mitigation policy is sometimes summarized in terms of a ratio, e.g., a particular project has

a mitigation ratio of 1:1. This ratio is likely to remain in place in future regulatory activities, as it is in keeping with the agency's historical policy of a "no net loss" of wetlands in the 404 permitting program.[4]

### 2.1.2 JURISDICTIONAL ISSUES

100. Three district-level ACOE regulatory offices are located in California and another is located in Oregon. The relationships between vernal pool complexes and other hydrological features in the environment change between Jackson County, Oregon in the north and Riverside County, California in the south. As a result, the regulatory approach adopted by each ACOE district towards the fill of vernal pools has historically varied. For the Portland, San Francisco, and Sacramento districts, vernal pools addressed in a 404 permit application are evaluated for their interconnection with neighboring floodplains, seasonal streams, and perennial wetlands.[5]

101. In contrast, the Los Angeles district of the ACOE does not generally assert jurisdiction over vernal pools occurring within its district, because the pools are more isolated and do not exhibit a hydrologic connection with adjacent hydrological features. In selected areas of vernal pool habitat in Riverside County, however, the Los Angeles district has determined that the impacted wetlands are waters of the U.S. These areas are within the floodplain of seasonal river systems and include all of the San Jacinto-Hemet proposed critical habitat unit in Riverside County.[6] In all other areas of the district, the history of regulation generally indicates that fill of vernal pools would not require a 404 permit and no baseline cost is imposed.[7]

102. For the rest of the state and for counties in Oregon, many projects proposing to fill a vernal pool require a 404 permit, and under critical habitat designation will also require consultation with the Service. As a baseline requirement for those projects, this economic analysis assumes that each acre of fill would, on average, be accompanied by an ACOE-driven plan for one acre of restoration.

103. A recent court decision may change the regulatory approach adopted by the Portland, San Francisco, Sacramento, and Los Angeles districts toward fill activity associated with vernal pools. On January 9, 2001, the U.S. Supreme Court issued

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[4]Personal communication with Chief, Sacramento Valley Office, U.S. Army Corps of Engineers, January 7, 2002.

[5]Personal communication with Wetland Specialist, Portland District Office and Regulatory Branch Chief, San Francisco District Offices, U.S. Army Corps of Engineers, March 8, 2002.

[6]Personal communication with Section 10 Conservation Coordinator, Carlsbad Field Office, U.S. Fish & Wildlife Service, October 24, 2002.

[7]Personal communication with Project Manager, Ventura Field Office, U.S. Army Corps of Engineers, March 7, 2002.

a decision in *Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers*. The decision changes the protection given to isolated wetlands under Section 404 of the CWA by ruling that the use of migratory birds to assert jurisdiction over the site exceeded the authority that Congress had granted the ACOE under the CWA.

104. The decision will likely restrict ACOE jurisdiction to navigable waters, their tributaries, and wetlands that are adjacent to these navigable waterways and tributaries, leaving "isolated" wetlands unprotected by the CWA. Prior to the SWANCC decision, the ACOE had adopted a regulatory definition of "waters of the U.S." that afforded Federal protection for almost all vernal pools.

105. The Portland, San Francisco, and Sacramento districts of the ACOE believe that no more than 10 percent of projects proposing fill of vernal pools will be affected by the SWANCC decision. The remaining 90 percent of vernal pools are believed to contain adequate connectivity to adjacent floodplain, wetland, or stream features for fill projects to require a 404 permit and associated mitigation measures.[8] It is also conceivable that no more than 10 percent of projects proposing fill of vernal pools in the Riverside County unit will be affected by the SWANCC decision.[9]

## 2.2 REGULATION OF PROJECT-RELATED ENVIRONMENTAL IMPACTS BY STATE AND LOCAL GOVERNMENTS

### 2.2.1 CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

106. This analysis will discuss whether implementation of the California Environmental Quality Act (CEQA) may indirectly impose costs attributable to critical habitat designation. It concludes that CEQA requirements can result in the imposition of indirect costs as a result of critical habitat designations. In the case of critical habitat designation for vernal pool species, however, CEQA requirements are better categorized as part of baseline regulation of vernal pool habitat, and not as additional regulation triggered by critical habitat designation.

107. This subsection will explain how CEQA functions to protect species and habitat and to what degree any CEQA-imposed costs may be linked to the designation of critical habitat. Special attention will be paid to the distinction that CEQA makes between projects with impacts to state or Federally listed species and projects with impacts to Federally designated critical habitat.

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[8]Personal communication with Chief, Sacramento Valley Office, U.S. Army Corps of Engineers, January 7, 2002.

[9]Personal communication with Section 10 Conservation Coordinator, Carlsbad Field Office, U.S. Fish & Wildlife Service, October 24, 2002.

108. CEQA is a California state statute that requires state and local agencies (known here as "lead agencies") to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. Projects carried out by Federal agencies are not subject to CEQA provisions. CEQA regulations require a lead agency to initially presume that a project will result in a potentially significant adverse environmental impact and to prepare an Environmental Impact Report (EIR) if the project may produce certain types of impacts, including when:

> *The project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory.*[10]

109. State law instructs the lead agency (typically a county or city community development or planning department in the case of land development projects) to examine impacts from a very broad perspective, taking into account the value of animal and plant habitats to be modified by the project. The lead agency must determine which, if any, project impacts are potentially significant and, for any such impacts identified, whether feasible mitigation measures or feasible alternatives will reduce the impacts to a level less than significant.

110. For all projects with impacts to habitat resources (as distinct from species population impacts), the State Department of Fish and Game (DFG) may review the draft EIR analysis during the public comment period for the document's treatment of important natural resources on the project site and characterization of project impacts to habitat and species of concern. DFG's comments on an EIR's analysis of habitat impacts would generally focus on biological values of habitat in proximity to the project and on potential project impacts on that habitat, and not on the property's status as federally designated critical habitat.

111. CEQA also does not permit reliance on a categorical exemption if a project takes place in a sensitive environment. A categorical exemption does not apply:

> *where a project may impact an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.*

#### 2.2.1.1 Baseline Effects of CEQA

112. Because CEQA regulations require consideration of significant effects on fish, wildlife or native plants and impacts to habitat resources regardless of the designation of critical habitat, it is important to separate baseline effects of CEQA

[10]California Code of Regulations, Title 14, §15065. Mandatory Findings of Significance.

from those that occur because of critical habitat designation. For project impacts on fish, wildlife, or native plants, a species listed under either the Federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA) is relevant to the lead agency's determination of whether impacts are significant.

113. For example, state or Federal listing of a species establishes a presumption that the species is endangered, threatened, or rare for CEQA purposes, and under the mandatory findings of significance, any reduction in the number or restriction in the range of an endangered, threatened, or rare species is initially presumed to be significant. For determination of whether there will be impacts to species and habitat resources, project consultants also often rely on the state's Natural Diversity Database and their own field surveys to provide the information about the presence of rare species, important habitat and natural communities.

114. When CEQA operates to require increased environmental process and mitigation because of the presence of rare or listed species or habitats, these effects are in the baseline of the analyses. These effects are directly attributable to the operation of state law, and are not an effect of critical habitat designation.

#### 2.2.1.2 Indirect Effects of Critical Habitat Designation on the Operation of CEQA

115. In some instances, the designation of critical habitat can have an indirect effect on CEQA related requirements. This is most likely to occur in areas where the federal designation provides clearer information on the importance of particular areas as habitat for listed species. In most cases, this may occur for areas that are not occupied by the species but are included in the designation because the habitat provides unique benefits to the species in terms of passage or recovery. It is reasonable to assume that state agencies may not have been aware of the importance of a particular area, especially if they relied on Federal consultations to highlight areas or activities of particular concern to a listed species. Historical consultations may not have occurred if in fact an area was not occupied by a listed species, a project lacked a Federal nexus, or if the project was found not to affect the species. In such instances, the informational aspects of a critical habitat designation, especially when a species lacks state protection, could be significant enough to warrant future indirect effects under CEQA.

116. If a project's effects on habitat are found to trigger the significance test in CEQA and result in the need to prepare an environmental impact report (EIR), it may also lead to the need for increased mitigation measures. In such a scenario, even if the habitat is subsequently designated as critical habitat, such mitigation measures are appropriately attributed to CEQA. Indirect critical habitat related impacts would occur, however, under those circumstances when the CEQA significance test is triggered because of the designation. Any resulting EIR costs and associated mitigation are rightly attributable to the designation because the additional information causes a change to baseline state behavior.

117. It is important to determine whether there are additional effects from CEQA that should be attributed to critical habitat in areas where there is not a likely Federal nexus for projects. These are areas where consultations are not expected in the future, but there may be impacts nonetheless. For example, CEQA does not permit reliance on a categorical exemption if a project takes place in a sensitive environment. A categorical exemption does not apply

> *where a project may impact an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.*

118. Thus, where critical habitat is designated, and where there were no previous state or local laws indicating the importance of the habitat at issue, there would be expected to be cost impacts resulting from compliance with CEQA by those who might otherwise have received a categorical exemption.

#### 2.2.1.3 Application to Vernal Pool Species

119. In the case of vernal pool species, the entire area proposed to be designated as critical habitat is occupied by the species. However, in some areas, consultations do not regularly occur because of a lack of Federal nexus for project development. These areas were examined for possible impacts as a result of CEQA. However, this analysis has determined that there are no likely impacts.

120. Vernal pool habitat is already highly regulated in California. The state Department of Fish and Game generally endorses a policy of no net loss of wetland quality and acreage. CEQA itself is very protective of wetlands. Courts have required the analysis and mitigation of wetland impacts under CEQA even when the amount of wetlands affected is quite small (the case cited on CEQA is *Mira Monte Homeowners Association v. County of Ventura*, 165 Cal App. 3rd 357 (1985)).

121. In addition to the regulation of wetlands in California, many of the species covered by this proposed designation are state-listed species. Some have been listed by the state since as early as 1979. Therefore, the rarity of these species is undoubtedly well known to developers and project planners in California. CEQA provisions that apply where state or federally-listed species or habitat is present would have been in effect for some time.

122. Because of the existing high degree of regulation of vernal pool habitat in California, it is unlikely that a critical habitat designation will provide any additional information about the importance of the habitat. Therefore, this analysis assumes that the designation of critical habitat for the vernal pool species will not have an effect on baseline compliance costs under CEQA.

### 2.2.2 CALIFORNIA ENDANGERED SPECIES ACT (CESA)

123. Two questions are germane to the implementation of the California Endangered Species Act (CESA) once critical habitat is proposed for vernal pool species.

- Will there be additional economic impacts for projects within proposed critical habitat from the implementation of CEQA for those vernal pool species that are state listed under CESA?

- Will there be additional section 7 consultations or project modifications for projects that may impact critical habitat because a vernal pool species is state listed under CESA?

124. The first question was introduced in the previous section regarding indirect CEQA impacts and will be further addressed here, and the second question is addressed below for the first time.

125. Nine of the 15 vernal pool species subject to the proposed designation of critical habitat are listed as threatened or endangered under CESA. The nine are all plants and their listings predate their federal listing under the ESA. As discussed in the CEQA section above, any project-related reductions in the populations of any state or Federally listed species automatically elevate the impact to a significant level, and the lead agency for the project may require mitigation from the project applicant.

126. Related to this CEQA impact, lead agency land use ordinances or general plan policies may require that projects with impacts to any state listed species document those impacts and propose mitigation under certain circumstances. The evaluation of these impacts and requirements of proposed mitigation normally occurs within the CEQA review process itself.

127. Both general plan-based and land use ordinance-based regulation, however, are derived from the state or Federal listing of the species and not from the designation of critical habitat for the species. So while actions under CESA may impose costs on project applicants, critical habitat designation does not trigger or amplify any action under CESA. In these cases, costs related to the state listing of vernal pool species will be considered as part of the regulatory baseline.

128. The second question asks whether state listing of a vernal pool species may increase the number of section 7 consultations or project modifications. An action agency may believe that its activities would impact a state listed species and

possibly violate state law, resulting in more consultations with the Service. The ESA prohibits action agencies from violating state laws through activities that affect Federally listed plant species.[11]

129. Because only vernal pool plant species are currently state listed, this effect would only occur in habitat where listed plant species but no crustaceans are present. Where crustaceans are present, this analysis assumes that action agencies will initiate a section 7 consultation if the project may adversely affect those species. A project sited on land where only listed vernal pool plant species are present, and no crustaceans are present, is an unlikely scenario. As discussed later in Section 4.8 of this analysis, project proponents are almost certain to assume that a listed crustacean inhabits the project site and proceed with a section 7 consultation based on the prohibition against take of animal species. The likelihood of section 7 consultations in this analysis, therefore, is not influenced by an action agency's consideration of whether the project would violate CESA.

### 2.2.3 CALIFORNIA WATER CODE

130. State level regulation of discharge to water bodies jurisdictional to the State of California is evolving to include fill of vernal pools. The SWANCC decision referenced earlier is likely, over time, to remove several types of water features from the jurisdiction of the U.S. Army Corps of Engineers. In response, nine regional entities known as the Regional Water Quality Control Boards may begin to regulate vernal pool fill in the next 20 years.[12] This analysis will examine whether critical habitat designation will indirectly result in this kind of additional state regulation of vernal pool fill, potentially leading to higher costs for project applicants.

131. Officials at the regional board with the largest overlap of jurisdiction with proposed critical habitat assert that provisions of the state Water Code and CEQA provides the means through which the board is likely to address vernal pool fill activity.[13] Just over half of the regional boards are expected to initiate review of proposed fill activity for projects in which no Federal nexus exists. As part of

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[11]Section 9(a) of the ESA contains the following text: "*Except as provided in sections 6(g)(2) and 10 of this Act, with respect to any endangered species of plants listed pursuant to section 4 of this Act, it is unlawful for any person subject to the jurisdiction of the United States to (A) import any such species into, or export any such species from, the United States; (B) remove and reduce to possession any such species from areas under Federal jurisdiction; maliciously damage or destroy any such species on any such area; or remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any law or regulation of any state or in the course of any violation of a state criminal trespass law*." Emphasis added.

[12]Personal communication with Senior Water Resources Engineer, Sacramento Regional Water Quality Control Board, Sacramento, CA, September 23, 2002.

[13]California State Water Code §13260.

regional board participation in the CEQA process, these boards may ask that project applicants replicate the Service's compensation, restoration and avoidance requirements even when no Federal nexus is present.

132. This analysis considers this level of state regulation to be part of the regulatory baseline and wholly dependent on the regional boards' response to jurisdictional changes following the SWANCC decision. Critical habitat designation, as discussed in the CEQA section above, does not trigger a finding of a significant impact or any project mitigation. In the case of regional water quality control boards, statutory authority is established for regulating the fill of vernal pools because vernal pools are likely to be considered waters of the State of California in the future.

# III. IMPACTS OF CRITICAL HABITAT DESIGNATION ON LAND USE

133. The previous two chapters introduced the geographic areas where the Service is proposing to designate critical habitat for vernal pool species. This chapter will identify the current land use activities within and/or affected by the proposed critical habitat designation as well as the location, nature, and extent of future activities that may be affected by section 7 implementation in the critical habitat area. The chapter finishes by providing estimates of the number of section 7 consultations and other impacts on activities affecting the critical habitat designation.

134. Importantly, these estimates include all section 7-derived consultations and technical assistance calls associated with the proposed critical habitat area. As such, this section does not attempt to distinguish which impacts may be attributable co-extensively to the listing of vernal pool species. Therefore, the impacts addressed in this chapter reflect the upper-bound of impacts caused by the designation. The estimated economic costs of these potential impacts are addressed in Chapter 4.

135. Because development pressures and potential Federal nexuses are similar for units located in the same region, this chapter discusses impacts by land use activity. It first addresses impacts associated with agriculture. Next, it addresses impacts associated with private land development and the required ACOE 404 permits for filling vernal pools prior to construction. Finally, this chapter addresses impacts associated with all other action agency activities identified in proposed critical habitat areas. Each land development section begins with a socioeconomic profile of the region, including general trends associated with population, economic, and urban growth. This information is augmented by projections of future projects likely to require section 7 consultation in each proposed critical habitat unit over the next 20 years.

## 3.1 IMPACTS OF SECTION 7 IMPLEMENTATION ON AGRICULTURAL ACTIVITIES

136. Vernal pool habitat can be impacted by the conversion of rangeland or other rural land uses into cultivated cropland. While annual crop types can be converted to permanent crops (tree grown, for instance) , uncultivated land can be converted to grow these crops as well. Sometimes shifts in local water availability can induce land conversion. Price shifts in commodity markets can also apply pressures leading to land conversion. Over the past ten years in California, for example, it is estimated that many acres have been converted to viticultural (wine grapes) use. A significant amount of that planting occurred on land with no previous cultivation.

137. As part of the 1991 Amendments to the Clean Water Act, Congress gave the U.S. Department of Agriculture (USDA) authority to delineate wetlands, including vernal pools on agricultural lands. This program had been designed to inform agricultural landowners about wetlands and to allow for ACOE regulation if those wetlands are impacted by farming activities. Regulation of fill activity had been directed especially at farmers receiving USDA crop subsidies.[14]

138. To date, officials in the ACOE and the USDA report very few applications for 404 permits from agricultural land uses. According to the USDA, many agricultural activities may co-exist with vernal pools and not be defined as filling or discharging into the pool or its associated hydrological structures.[15] Given the record of negligible numbers of permit applications from agricultural landowners, this analysis did not assume that the ACOE or Service will involve themselves in agricultural operations in the future. The issue is currently being litigated, however, and the likely regulatory future of these activities is uncertain.

## 3.2 IMPACTS OF SECTION 7 IMPLEMENTATION ON LAND DEVELOPMENT ACTIVITIES

139. Land development is likely to generate the most section 7 consultations of all land use activities. The significant growth projected over the next 20 years in a large number of California counties will require new residential, commercial, and industrial development, as well as numerous local and state infrastructure and capital facilities projects. In some counties, the path of growth will overlap with proposed critical habitat units during the next 20 years, requiring consultations and associated project modifications. This section provides a description of the expected growth patterns in counties where section 7 consultations are likely to occur. It also places these patterns in their proper statewide and regional context.

140. This section is divided into numerous subsections. The first describes the reason for the specific focus on certain counties and the division of the State into regions. The second provides an overview of growth trends in California. The third describes the types of land development pertinent to this analysis and the methodology used to project areas of potential land development over the next 20 years. The fourth section describes the general growth pressures in all the relevant regions of California, the projected growth over the next 20 years, and the acres of land expected to be developed. The fourth section also estimates the total overlap between land development and proposed critical habitat in each county.

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[14]Personal communication with Biologists, Red Bluff and Elk Grove Service Centers, Natural Resources Conservation Service, March 20, 2002.

[15]Personal communication with Biologists, Red Bluff and Elk Grove Service Centers, Natural Resources Conservation Service, March 20, 2002.

141. Due to the large area and number of regions covered, this analysis is gross in nature. Consistent California-wide statistics have been used where possible, with standard estimating techniques used where no prior research was available.

### 3.2.1 COUNTIES AND REGIONS

142. Critical habitat units are present in 37 counties, including 36 of California's 56 counties and 1 Oregon county. Three California counties, including Riverside, Ventura, and Santa Barbara, fall under the jurisdiction of the ACOE's Los Angeles District. A fourth county, San Luis Obispo, is split between the Los Angeles and the Sacramento Districts, although the majority of vernal pool acres lies within the ACOE's Sacramento District. As detailed in the previous chapter, the Los Angeles District does not generally consider vernal pools to be within its regulatory jurisdiction and is not expected to require the issuance of section 404 permits for land development sited within most critical habitat units. The exception is Riverside County's San Jacinto-Hemet proposed critical habitat unit. Because of the lack of Federal nexus in Ventura and Santa Barbara Counties, however, both are excluded from the analysis below, and 35 counties remain.

### 3.2.2 CALIFORNIA GROWTH OVERVIEW

143. As shown in **Table 3**, the State of California has grown exponentially over the last 50 years, from 10.6 million persons in 1950 to 34.1 million in 2000, an average annual growth rate of 2.3 percent. A large proportion of this growth has been from migration from other states and countries (slightly more than 50 percent). This pattern and speed of growth is expected to continue over the next 20 years. By that time, a total of 11.3 million more people are expected to reside in California. About 4.8 million of these persons are expected to reside in the 36 counties with proposed critical habitat units, and about 3.5 million in counties with critical habitat but outside of ACOE Los Angeles District jurisdiction.[16]

144. Land development will inevitably overlap with proposed critical habitat units in certain counties. This land development may be in the form of private real estate development, including residential, commercial, and industrial development, or may include infrastructure or other public works projects conducted by local agencies, state agencies, or developers. Residential land uses generally require the largest amount of land compared to the other major land uses in urban areas, including commercial, industrial, office, and public uses. As a result, it is often used as the key estimating variable of land development.

145. Residential development does, however, occur within a range of densities. Higher density projects that expand outwards from existing land development can reach densities of over ten units per acre. More typical are residential

[16]State of California, Department of Finance, Interim County Population Projections, Sacramento, California, June 2001.

**Table 3**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Population in Select California Counties and Regions, 1950-2000**

| Region | Population [1] | | |
|---|---|---|---|
| | 1950 | 1970 | 2000 |
| San Francisco Bay Region | 1,190,700 | 1,878,700 | 2,928,900 |
| San Joaquin Valley Region | 907,300 | 1,300,100 | 2,662,200 |
| Mountain Region | 72,400 | 69,200 | 109,200 |
| Upper Sacramento Valley Region | 147,700 | 239,100 | 471,300 |
| Sacramento Valley Region | 383,800 | 848,500 | 1,709,600 |
| Northern Coast Region | 52,300 | 70,600 | 145,700 |
| Central Coast Region | 196,300 | 371,400 | 704,800 |
| Sierra Nevada Foothills Region | 36,800 | 53,600 | 147,900 |
| Southern California | 382,900 | 1,099,700 | 2,712,600 |
| **CALIFORNIA [2]** | **10,586,223** | **19,971,069** | **34,088,000** |

*"pop_growth"*

Source: CA Department of Finance Report I 90-00 July, I 1970 to 1980, and Intercensal Estimates, 1940-69.

[1] The population shown is for counties having proposed critical habitat within each region and not the entire region.
[2] The selected regions above do not include all counties in California. Therefore, the total population in California will not equal the sum of the above regions.

subdivisions in the three to five units per acre range. A much smaller number of persons, less than 6 percent of California residents, reside outside of urbanized areas.[17] These persons, however, often reside, whether as a primary or secondary residence, on rural residential or rural estate parcels with densities of one unit per five, ten, 20 or more acres. While a small proportion of overall persons, the acreage ownership covered by these parcels is large.

### 3.2.3 LAND DEVELOPMENT PROJECTIONS METHODOLOGY

146. To determine the likelihood of development occurring within proposed critical habitat areas, a Geographic Information Systems (GIS) analysis combined the results of an urban growth model with the proposed critical habitat areas. Researchers at the Institute of Urban and Regional Development and the University of California, Berkeley have developed an urban growth model called the California Urban and Biodiversity Analysis (CURBA) model.

147. The CURBA model uses GIS technology to provide spatial predictions of the extent of urban growth in the year 2020. The model relies on the current location and type of farmland and urban development, slope and elevation data, location of roads and hydrographic features, wetlands and flood zones, proximity to jurisdictional boundaries, local growth policies, recent population and job growth, and population projections by county. The CURBA model defines land occupied by structures with a building density of at least one unit every 1.5 acres as urbanized land.[18]

148. Some improvement to land area in the next 20 years will be intermediate between urban and agricultural in nature. Single family rural homebuilding, for instance, will account for a significant portion of total residential construction in the 37 counties. The impact of critical habitat designation on this type of development is less certain.

149. A likely outcome is that the larger parcel sizes (in many instances 2.5 acre, 5 acre, or 10 acre lots) allow the landowner, without reducing the size of the home or the value of the property, to choose the development footprint carefully and avoid triggering a Federal nexus as described in Chapter 2. Given that CURBA does not capture the areas in which these rural homes are built at densities less than one unit every 1.5 acres, the acres of projected growth do not include the rural single family unit projects.

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[17]Census 2000 Summary File 3 for the state of California as reported by http://factfinder.census.gov.

[18]J.D. Landis et al., *Development and Pilot Application of the California Urban and Biodiversity Analysis (CURBA) Model*, University of California - Berkeley, Institute of Urban and Regional Development, 1998.

150. The CURBA model also does not consider local development restrictions or land ownership in its calculations. Because some lands that are predicted to become urbanized may in fact be designated as park or open space areas, the model is likely to overestimate the amount of growth that is likely to occur. This potential overestimation makes the analysis more likely to overstate, rather than understate, potential impacts associated with development.

151. By overlaying the proposed critical habitat unit areas over CURBA predictions, planning level conclusions can be drawn about where, and the extent to which, development is likely to take place within proposed critical habitat areas. The size of the land area affected by CURBA's growth projections is shown in **Table 4**.

152. When counties contain proposed critical habitat units but no CURBA scenarios are available, a different methodology was followed. Population growth forecasts were collected for each community or city adjacent to or overlapping with critical habitat units; GIS spatial analysis techniques were used to calculate the overlap in acres between the municipal or community boundaries and the proposed habitat units. Population to urbanized land ratios were collected from CURBA, state farmland resources agency, and Census sources for the region in question, and these ratios were applied to the 20 year population growth projection to generate an estimate of demand for developable land. CURBA ratios were preferred when available; otherwise, the data source with land area data at the most appropriate geographic scale (city versus county, for instance) was chosen.

153. If the needed area of developable land was not available within existing municipal or community boundaries and annexation would be needed to augment the land supply, then the city or community was allowed to grow through annexation by the required acreage. Local planning department staff were contacted to ascertain the sites that would have the highest likelihood of development approval. To estimate the impact in a way that is more likely to overstate, rather than understate, impacts, the full required acreage for growth was assumed to occur within the proposed habitat unit if the unit was located close to the community/city and on the path of projected growth.

154. Vacant, undevelopable land and already developed land located within proposed critical habitat units, including airports, railyards, and other public uses, was not added to the inventory of land area that would accommodate the expected growth over 20 years. As shown in **Table 4**, of the 17 counties having no CURBA model output, six were determined to have communities or cities likely to urbanize over 20 years a total of 5,400 acres of land included in proposed critical habitat units. Proposed critical habitat in the other 11 counties are not directly in the likely path of future urban growth.

**Table 4**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Urban Growth in Counties with Proposed Critical Habitat [1]**

| ID | Region or County | Urban Growth Projected Within Critical Habitat | | Projected Urban Growth Over 20 Years | Proposed Critical Habitat Land Area | | County Total Land Area |
|---|---|---|---|---|---|---|---|
| | | *Group A [2]* | *Group B [2]* | *acres* | *Group A [2]* | *Group B [2]* | *acres* |
| | **San Francisco Bay** | | | | | | |
| 1 | Alameda | 1,851 | 0 | 44,404 | 3,187 | 0 | 472,000 |
| 2 | Contra Costa | 0 | 0 | 31,044 | 7,630 | 0 | 460,980 |
| 3 | Napa | 287 | 0 | 9,454 | 3,229 | 0 | 482,470 |
| 4 | Solano | 5,797 | 701 | 40,844 | 69,949 | 26,009 | 530,030 |
| | **Subtotal** | **7,935** | **701** | **125,746** | **83,995** | **26,009** | **1,945,480** |
| | **San Joaquin Valley Region** | | | | | | |
| 5 | Fresno | 6 | 0 | 38,188 | 36,014 | 0 | 3,816,450 |
| 6 | Kings | 8 | 0 | 14,492 | 834 | 0 | 889,270 |
| 7 | Madera | 344 | 0 | 22,031 | 112,456 | 0 | 1,368,590 |
| 8 | Merced | 0 | 471 | 17,569 | 50,240 | 287,209 | 1,234,490 |
| 9 | San Joaquin | 0 | 0 | 85,176 | 19,903 | 0 | 895,640 |
| 10 | Stanislaus | 0 | 0 | 30,399 | 4,437 | 150,477 | 956,520 |
| 11 | Tulare | 193 | 0 | 30,696 | 54,242 | 0 | 3,087,570 |
| | **Subtotal** | **551** | **471** | **238,552** | **278,126** | **437,686** | **12,248,530** |
| | **Mountain Region** | | | | | | |
| 12 | Lassen | 0 | 0 | [3] | 23,719 | 0 | 2,916,790 |
| 13 | Modoc | 0 | 0 | [3] | 2,413 | 0 | 2,524,390 |
| 14 | Plumas | 607 | 0 | [3] | 1,287 | 0 | 1,634,540 |
| 15 | Siskiyou | 0 | 0 | [3] | 5,728 | 0 | 4,023,850 |
| | **Subtotal** | **607** | **0** | **[3]** | **33,147** | **0** | **11,099,570** |
| | **Upper Sacramento Valley Region** | | | | | | |
| 16 | Butte | 300 | 320 | [3] | 24,857 | 44,859 | 1,049,340 |
| 17 | Colusa | 230 | 662 | [3] | 1,298 | 3,740 | 736,500 |
| 18 | Glenn | 0 | 0 | [3] | 304 | 10,383 | 841,530 |
| 19 | Shasta | 2,467 | 0 | [3] | 40,352 | 0 | 2,422,820 |
| 20 | Tehama | 98 | 26 | [3] | 116,450 | 31,118 | 1,888,670 |
| | **Subtotal** | **3,095** | **1,008** | **[3]** | **183,261** | **90,100** | **6,938,860** |
| | **Sacramento Valley Region** | | | | | | |
| 21 | Placer | 2,736 | 0 | 27,538 | 47,754 | 0 | 612,900 |
| 22 | Sacramento | 515 | 688 | 48,527 | 47,524 | 58,157 | 618,040 |
| 23 | Yolo | 0 | 1 | 3,664 | 0 | 474 | 647,960 |
| 24 | Yuba | 0 | 0 | [3] | 7,046 | 0 | 403,490 |
| | **Subtotal** | **3,251** | **689** | **79,729** | **102,324** | **58,631** | **2,282,390** |
| | **Northern Coast Region** | | | | | | |
| 25 | Lake | 0 | 0 | [3] | 4,189 | 0 | 805,420 |
| 26 | Mendocino | 0 | 0 | [3] | 2,635 | 0 | 2,245,940 |
| | **Subtotal** | **0** | **0** | **[3]** | **6,824** | **0** | **3,051,360** |

**Table 4**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Urban Growth in Counties with Proposed Critical Habitat [1]**

| ID | Region or County | Urban Growth Projected Within Critical Habitat | | Projected Urban Growth Over 20 Years | Proposed Critical Habitat Land Area | | County Total Land Area |
|---|---|---|---|---|---|---|---|
| | | *Group A [2]* | *Group B [2]* | *acres* | *Group A [2]* | *Group B [2]* | *acres* |
| | **Central Coast Region** | | | | | | |
| 27 | Monterey | 828 | 0 | 52,528 | 77,907 | 0 | 2,126,040 |
| 28 | San Luis Obispo | 1,619 | 0 | 37,374 | 85,247 | 0 | 2,114,880 |
| 29 | San Benito | 0 | 0 | 9,853 | 91,291 | 0 | 889,050 |
| | **Subtotal** | **2,447** | **0** | **99,755** | **254,445** | **0** | **5,129,970** |
| | **Sierra Nevada Foothills Region** | | | | | | |
| 30 | Amador | 0 | 0 | [3] | 725 | 2,682 | 379,240 |
| 31 | Calaveras | 0 | 0 | [3] | 0 | 100 | 652,920 |
| 32 | Mariposa | 0 | 0 | [3] | 978 | 17,008 | 928,780 |
| 33 | Tuolumne | 0 | 0 | [3] | 1,307 | 1,006 | 1,430,820 |
| | **Subtotal** | **0** | **0** | **[3]** | **3,010** | **20,796** | **3,391,760** |
| | **Jackson County, Oregon** | | | | | | |
| 34 | Jackson | 1,289 | 0 | [3] | 7,621 | 0 | 1,792,647 |
| | **Southern California** | | | | | | |
| 35 | Riverside | 4,328 | 0 | 419,176 | 10,209 | 0 | 4,613,220 |
| 36 | Santa Barbara | 0 | 0 | 25,552 | 20,746 | 0 | 1,725,620 |
| 37 | Ventura | 0 | 0 | 71,919 | 0 | 46,512 | 1,181,410 |
| | **Subtotal** | **4,328** | **0** | **516,647** | **30,955** | **46,512** | **7,520,250** |
| **37 COUNTY AREA GRAND** | | **23,503** | **2,869** | **1,060,429** | **983,708** | **679,734** | **55,400,817** |
| | | | | | | | *"overlap"* |

Sources: CURBA Model (J. Landis et al., 1998), U.S. Census Bureau, California State Department of Finance, Sacramento Area Council of Governments, Association of Bay Area Governments, Southern California Association of Governments, Fresno and Merced Counties, and Oregon State Office of Economic Analysis.

[1] All figures are in acres.
[2] All land area within critical habitat units designated for species with few remaining populations (Butte County Meadowfoam, Colusa Grass, Conservancy Fairy Shrimp, Sacramento Orcutt Grass, or Solano Grass) is classified by this analysis as acres of Group B habitat. Land area within critical habitat solely designated for the ten other vernal pool species is classified as acres of Group A habitat. The distinction is made to capture differences in expected section 7 regulation between the two.
[3] These counties are not included in the CURBA Model and do not have an easily calculated land area for urban growth over 20 years. Alternative methods were applied to determine county sub-area land needs given projected population growth.
[4] Total acres of proposed critical habitat for the 15 species is 1,663,442 acres.

### 3.2.4 LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE SAN FRANCISCO BAY AREA REGION

155. The San Francisco Bay Area Region includes the counties of Alameda, Contra Costa, Napa, Marin, Sonoma, Solano, San Francisco, San Mateo, and Santa Clara. Alameda, Contra Costa, Napa and Solano counties are the only counties that contain proposed critical habitat units. The population of these four counties is projected to increase by 22 percent, or 649,600 people, over the 20-year period ending in 2020. Approximately 95 percent of these people are expected to reside in Alameda, Contra Costa, and Solano counties.[19]

156. The region's diverse and fast growing economic base has attracted considerable numbers of new residents in the past five to ten years, many from other countries. High housing prices in Alameda, Santa Clara, and San Mateo counties are likely to continue to decentralize population growth, pushing it toward the edge of the region where workers are able to find less expensive housing. Real estate prices have already caused some of these workers to live outside of the region in the northern San Joaquin Valley or southern Sacramento Valley and commute long distances to their jobs. Nonetheless, growth prospects remain strong for the San Francisco Bay Area Region, in part because of its numerous cultural and recreational amenities.

157. The CURBA model estimates that urban growth in Alameda, Contra Costa, Napa, and Solano counties will require approximately 125,700 additional acres of currently rural land by 2020, representing an average new population to land area ratio of 5.2 persons per acre on newly developed land.[20]

158. A total of 110,000 acres have been proposed for critical habitat in these counties. The total overlap between areas of expected urban growth and proposed critical habitat is approximately 8,600 acres.

159. Solano, Alameda, and Napa counties are expected to have projects proposing development on 8,600 acres of proposed vernal pool critical habitat. The breakdown of this overlap includes 4,400 acres in Solano County on the eastern edges of the cities of Fairfield and Vacaville along Interstate 80; 1,800 acres in Alameda County just north of the City of Livermore, along State Highway 580; and nearly 300 acres in Napa County southwest of the junction of State Highways 12 and 121. These projects will require extensive ACOE consultations as vernal pools are filled prior to homebuilding, road building, and other non-residential construction.

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[19] Association of Bay Area Governments (ABAG), *Projections 2001*, p. XX.

[20] J.D. Landis et al., *Development and Pilot Application of the California Urban and Biodiversity Analysis (CURBA) Model*, University of California - Berkeley, Institute of Urban and Regional Development, 1998.

160. In contrast, critical habitat proposed for Contra Costa County does not appear to be in the path of urban growth through 2020.

### 3.2.5 LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE SAN JOAQUIN VALLEY REGION

161. The San Joaquin Valley region includes the counties of Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare. Kern County does not contain proposed critical habitat and will therefore be excluded from this discussion. The population of the remaining seven counties is projected to increase by 51 percent, or approximately 1.4 million people, over the 20-year period ending in 2020. About 65 percent of these people are expected to reside in Fresno, San Joaquin, and Stanislaus counties.[21]

162. The region will likely be California's fastest growing in the coming ten years, due in part to the low cost of housing and land in comparison to the Bay Area and Southern California. Because of the region's agricultural economic base, wages are generally low and contribute to lower rates of migration to the San Joaquin region from other states and higher rates of migration out of the region to other places. However, natural population increases and strong immigration rates from Asia and Mexico compensate for these trends and bring additional people to the region.

163. The CURBA model estimates that urban growth in the seven counties will require approximately 238,600 additional acres of currently rural land by 2020, based on an average new population to land area ratio of 5.8 persons per acre.[22]

164. A total of 438,000 acres have been proposed for critical habitat in the seven counties. The total overlap between areas of expected urban growth and proposed critical habitat is approximately 1,100 acres.

165. Madera, Merced, and Tulare counties are expected to have the most significant amount of overlap. Projects proposing development are expected on approximately 1,040 acres in three locations: nearly 300 acres in Madera County just east of State Highway 99, bordering the community of Madera Acres; nearly 500 acres in Merced County between State Highway 140 and State Highway 17, just north of the towns of Merced and Planada; and approximately 240 acres in Tulare County just east of State Highway 63, near the towns of London and Goshen. These projects will require extensive ACOE consultations as vernal pools are filled prior to homebuilding, road building, and other non-residential construction.

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[21] *Interim County Population Projections*, California Department of Finance, June 2001. http://www.dof.ca.gov/HTML/DEMOGRAP/P1.doc

[22] J.D. Landis et al., *Development and Pilot Application of the California Urban and Biodiversity Analysis (CURBA) Model*, University of California - Berkeley, Institute of Urban and Regional Development, 1998.

166. In 1995, the University of California, which administers the state's system of major research universities, selected Merced County as its preferred location for its tenth campus. The campus is expected to open in 2004. Over the last several years, a broad planning effort has been undertaken to determine the preferred location, size, design, and financing for both the core campus and the associated university community. Many variables for the project remain undetermined at this time. Possible sites encompass the development of about 3,000 acres, including about 910 acres for the campus and about 2,100 acres for the community.[23] Campus and community development will impact about 66.5 acres of wetted vernal pools, pools/swales, and seasonal wetlands.[24]

167. Preliminary estimates of mitigation costs for an early campus and community development prototype estimated the wetlands mitigation costs at about $90,000 per wetted acre affected. At this unit cost, total mitigation costs associated with the current estimate of wetted vernal pool loss would be about $6 million. These costs would be payable over the course of University of California development and are not in present value dollars. These estimates were based on very approximate and preliminary assumptions.[25]

168. The actual mitigation and other costs associated with campus and community development will be determined over the next few years, as the Merced County Natural Community Conservation Plan/Habitat Conservation Plan is developed. At this time, the precise levels of conservation and mitigation associated with this project are not possible to predict until the Service has issued its Biological Opinion and the Army Corps of Engineers has approved a 404 permit for the project. A general association between the mitigation costs for the University of California project and other project costs under section 7 is expected, however, given the involvement of the Service in consultations that have occurred to date.

169. In this region, critical habitat proposed for Fresno, Kings, San Joaquin, and Stanislaus counties does not appear to be in the path of urban growth through 2020.

### 3.2.6 LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE MOUNTAIN REGION

170. The Mountain Region includes the counties of Lassen, Modoc, Nevada, Plumas, Sierra, and Siskiyou counties. Sierra and Nevada counties do not contain proposed critical habitat and will therefore be excluded from this discussion. The

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[23]Gibson & Skordal, Section 404 Permit Application, UC Merced Campus Project, February 8, 2002 .

[24]EIP Associates, Section 404 Permit Application, University Community Plan, February 8, 2002.

[25]Economic & Planning Systems, Inc., Preliminary UC Merced Habitat Conservation Cost Estimate, March 14, 2000.

population of the remaining four counties is projected to increase by 25 percent, or 27,600 people, over the 20-year period ending in 2020. Over 81 percent of these people are expected to reside in Lassen, Modoc, and Siskiyou counties.[26]

171. This region, sparsely populated and far from major metropolitan areas, has historically depended on lumber and wood product sales from a natural resource base located largely on public lands. Over time, timber harvest rates have been substantially reduced, and today a growing share of employment in this region depends on the seasonal nature of tourism and recreation. For the next 20 years, growth in the Mountain Region's year-round population and job base is likely to be more moderate than the rest of the state, with government, retail trade, and other service sector employment categories providing more than 90 percent of all job growth.[27]

172. Based on a new population to land area ratio of 5.2 persons per acre in these counties, approximately 5,300 additional acres of land will be developed by 2020.[28]

173. A total of 33,149 acres have been proposed for critical habitat in the four counties. Projects proposing development are expected on approximately 607 of those acres in Plumas County, near the town of Almanor between Lake Almanor and Highway 89. Other proposed critical habitat areas in the region do not appear to be in the path of urban growth through 2020.

### 3.2.7 LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE UPPER SACRAMENTO VALLEY REGION

174. The Upper Sacramento Valley Region includes the counties of Butte, Colusa, Glenn, Shasta, and Tehama counties. The population of this region is projected to increase by 44 percent, or 310,500 people, over the 20-year period ending in 2020. Nearly 80 percent of these people are expected to reside in Butte and Shasta counties.[29]

175. The Upper Sacramento Valley Region includes a mixture of cultivated lands on the Valley floor with Coastal and Cascade Range forested upland. East and north of prime farmland, the region has two fast-growing cities, Chico and

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[26]State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001. http://www.ce.berkeley.edu/Courses/E11/lectures/califpop.pdf

[27]State of California, Employment Development Dept., *County Snapshot* (Lassen, Modoc, Siskiyou, Plumas), 2001. www.calmis.ca.gov.

[28]Farmland Mitigation and Mapping Program (FMMP), Division of Land Resource Protection, "1998 Acreage Summary." http://www.consrv.ca.gov/dlrp/fmmp/pubs/1996_1998/9698excel/1998_acreage_summary.xls , and 2000 U.S. Census.

[29]State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001. http://www.ce.berkeley.edu/Courses/E11/lectures/califpop.pdf

Redding, and a mostly agricultural economy in Colusa, Glenn, Tehama, and western Butte counties. The region has several growth-generating attributes, including low housing prices, abundant energy supplies, available land for commercial and industrial enterprises, a strong quality of life component, and a low-cost but highly trained workforce. The area's growth over the next 20 years will, however, be constrained by its distance from a major metropolitan areas and its historical focus on agriculture.[30]

176. Based on a new population to land area ratio of 6.7 persons per acre in these counties, approximately 46,100 additional acres of land will be developed by 2020.

177. A total of 363,400 acres have been proposed for critical habitat in the five counties. Projects proposing development of these areas are expected on approximately 4,100 acres in four locations: nearly 2,500 acres in Shasta County near the City of Redding along Highway 44 and within the southeast corner of the City boundary; nearly 900 acres in Colusa County near the City of Colusa along Highway 20; over 600 acres in Butte County near the City of Chico along its northern and eastern edges; and approximately 125 acres in Tehama County within the southwestern corner of the City of Red Bluff.

178. In contrast, critical habitat proposed for Colusa, Glenn, and Tehama counties does not appear to be in the path of urban growth through 2020.

### 3.2.8 LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE SIERRA NEVADA FOOTHILLS REGION

179. The Sierra Nevada Foothills region includes the counties of Amador, Calaveras, Mariposa, and Tuolumne. The population of this region is projected to increase by 38 percent, or 56,000 people, over the 20-year period ending in 2020. Over 75 percent of these people are expected to reside in Calaveras and Tuolumne counties.[31]

180. Relocation due to retirement and the expansion of nearby regional job markets for commuters have been responsible for recent population growth in the Sierra Nevada Foothills Region. Retirement of increasing numbers of baby boomers are likely to maintain the pace of homebuilding in these counties, although job growth within the region is less certain. Many communities in the region are dependent on tourism and recreation, offering seasonal employment growth in the service industries when economic and weather conditions favor expansion,

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[30]Economic Development Council of Shasta County webpages visited August 15, 2002 at http://www.shastaedc.org/targeted-industries.asp and the City of Redding's Metro Redding Report Web pages visited August 15, 2002 at http://www.ci.redding.ca.us/metro/aboutmet.htm.

[31]Farmland Mitigation and Mapping Program (FMMP), Division of Land Resource Protection, "1998 Acreage Summary." http://www.consrv.ca.gov/dlrp/fmmp/pubs/1996_1998/9698excel/1998_acreage_summary.xls and 2000 U.S. Census.

and additional construction activity for second homes in certain areas. However, the low price of housing and land in relation to prices in nearby job centers such as Sacramento, Stockton, and Modesto will supply these counties with growing numbers of new residents for many years to come.[32]

181. Based on a new population to land area ratio of 4.4 persons per acre in these counties, approximately 78,200 additional acres of undeveloped land will develop by 2020.[33]

182. A total of 23,807 acres have been proposed for critical habitat in the four counties. Critical habitat proposed for all four counties does not appear to be in the path of urban growth through 2020.

### 3.2.9 LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE SACRAMENTO VALLEY REGION

183. The Sacramento Region includes the counties of El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba. El Dorado and Sutter counties do not contain proposed critical habitat and are excluded from this discussion. The population of the six county Sacramento Region is projected to increase by 35 percent, or 810,000 people, over the 20 year period ending 2020. Nearly 90 percent of these people are expected to reside in Placer, Sacramento, Yolo, or Yuba counties.[34]

184. A combination of low land and housing prices relative to the Bay Area, its location at the crossroads of major State transportation corridors, and its accumulation of a critical mass of population have all driven strong economic growth in the Sacramento region. New jobs have been plentiful, with the larger employers concentrated in high technology manufacturing, homebuilding, and processed foods industries. Population growth in this region over the last ten years is due primarily (55 percent) to migration. For the Sacramento Valley Region, migration's share of new residents is the highest among all of California's major regions, and is expected to remain high to keep pace with a job market that is projected to continue its strong expansion.[35]

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[32]State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001. http://www.ce.berkeley.edu/Courses/E11/lectures/califpop.pdf.
EPS professional experience.

[33]Farmland Mitigation and Mapping Program (FMMP), Division of Land Resource Protection, "1998 Acreage Summary." http://www.consrv.ca.gov/dlrp/fmmp/pubs/1996_1998/9698excel/1998_acreage_summary.xls

[34]Sacramento Area Council of Governments' Web site (www.sacog.org) information dated January 30, 2002.

[35]*California County Projections 2001*, Center for the Continuing Study of the California Economy, pp. 3-37 through 43.

185. A total of 84,300 acres of land is expected to be urbanized in the four counties over the next 20 years. The CURBA model estimates that urban growth in three of the six counties (Placer, Sacramento, and Yolo counties) will require 80,000 additional acres of land by 2020, yielding an average new population to land area ratio of 8.4 persons per acre on newly developed land. A moderate amount of land in Yuba County (less than 4,300 acres based on these densities) will be urbanized by 2020.

186. A total of 161,000 acres have been proposed for critical habitat in the four counties. The total overlap between areas of expected urban growth and proposed critical habitat is approximately 3,900 acres. Most of the overlap is expected to occur in Sacramento and Placer counties. Projects proposing development within vernal pool critical habitat units are expected on nearly 1,200 acres in Sacramento County between State Highway 50 and State Highway 16 and on nearly 2,700 acres in Placer County north and west of the Cities of Rocklin and Roseville. These projects will require extensive ACOE consultations as vernal pools are filled prior to homebuilding, roadbuilding, and other non-residential construction.

187. In contrast, critical habitat proposed for Yolo and Yuba counties do not appear to be in the path of urban growth through 2020.[36]

### 3.2.10 LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE NORTH COAST REGION

188. The North Coast Region includes the counties of Del Norte, Humboldt, Lake, Mendocino, and Trinity counties. Del Norte, Humboldt, and Trinity do not contain proposed critical habitat and will therefore be excluded from this discussion. The population of the remaining two counties is projected to increase by 43 percent, or 62,300 people, over the 20-year period ending in 2020. Approximately 54 percent of these people are expected to reside in Lake County and 46 percent in Mendocino County.[37]

189. Population growth in these counties will be driven in part by continued expansions in the tourist industry and associated demands for primary and second homes, as well as by the option of commuting into increasingly expensive Sonoma County. In the past, the distance of both counties in this region from larger job markets has limited employment growth. Today, strong quality of life factors related to these counties' rural character and lower cost of housing make them desirable to cottage industries and smaller visitor-centered businesses. Recent urban growth in Sonoma County and intense upward pressure on housing prices there has created strong demand for unincorporated Mendocino County land for single family housing along the State Highway 101 corridor, where

[36]Yolo County may have as much as one acre of development overlapping with critical habitat.

[37]State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001.

workers can live and still commute to jobs in Sonoma County. Future population growth in more geographically isolated Lake County will be moderated by a less skilled workforce and the scarcity of land available for employment sites.[38]

190. Based on a new population to land area ratio of 4.7 persons per acre in the counties, approximately 44,700 additional acres of land will be developed by 2020.[39]

191. A total of 6,800 acres have been proposed for critical habitat in both counties. Both counties in the North Coast region do not contain proposed critical habitat in the path of urban development.

### 3.2.11 LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE CENTRAL COAST REGION

192. The Central Coast region includes San Luis Obispo, Monterey, San Benito, and Santa Cruz counties. Santa Cruz County does not contain proposed critical habitat and will therefore be excluded from this discussion. The population of the remaining three counties sub-region is projected to increase by 44 percent, or 307,200 people, over the 20-year period ending in 2020. Approximately 90 percent of these people are expected to reside in Monterey and San Luis Obispo counties.[40]

193. Population growth in the northern portion of Monterey and San Benito counties is linked to economic activity to the north in the San Jose Metropolitan Area. Coastal amenities and smaller, more family-friendly communities in Monterey County will continue to attract the wealthier and higher income workers who can afford some of the highest housing prices in California. Most coastal areas will have limited land available for development due to local environmental and water supply constraints.

194. However, housing is less expensive and less restricted farther inland in San Benito County, where families with workers who commute to the Bay Area are likely to choose to reside wherever highway access is available. The southernnmost and fastest growing county in the region, San Luis Obispo County, by contrast, is much less influenced by Bay Area job and housing markets and, in many cases, may attract the self-employed and retired resident because of

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[38]Personal communication with Executive Director Mendocino Council of Governments, August 16, 2002 and the *Lake County Economic Development and Strategic Marketing Plan* found on the Lake County Web site August 16, 2002 at http://www.co.lake.ca.us/edsite/plan.pdf

[39]Farmland Mitigation and Mapping Program (FMMP), Division of Land Resource Protection, "1998 Acreage Summary." http://www.consrv.ca.gov/dlrp/fmmp/pubs/1996_1998/9698excel/1998_acreage_summary.xls

[40]State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001.

its coastal location and relaxed pace of life. To keep pace with the varied needs of new residents in the region, significant service sector employment growth is projected.[41]

195. The CURBA model estimates that urban growth in the three counties will require approximately 99,800 additional acres of currently rural land by 2020, representing an average new population to land area ratio of 3.1 persons per acre.[42]

196. A total of 254,445 acres have been proposed for critical habitat in the three counties. The total overlap between areas of expected urban growth and proposed critical habitat is approximately 2,400 acres.

197. San Luis Obispo County has the most significant amount of overlap. Projects proposing development within vernal pool critical habitat units are expected on nearly 1,620 acres in San Luis Obispo County on the edges of the City of Paso Robles along State Highway 46. Proposed development projects in Monterey County are expected to develop 800 acres of critical habitat mostly on the county's southern border along State Highway 14. These projects will require extensive ACOE consultations as vernal pools are filled prior to homebuilding, road building, and other non-residential construction.

198. In contrast, critical habitat proposed for San Benito County does not appear to be in the path of urban growth through 2020.

### 3.2.12 LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN JACKSON COUNTY, OREGON

199. The population of Jackson County, Oregon is projected to increase by 22 percent, or 40,400 people, over the 20-year period ending in 2020.[43] Historically a forest products and product distribution center, this region's future population growth will be driven in part by retirement immigration made possible because of lower land prices and a desirable quality of life. Job growth, however, is more limited and expected to be concentrated largely in government and retail trade occupations within the service sector.[44]

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[41]EPS project experience.

[42]J.D. Landis et al., *Development and Pilot Application of the California Urban and Biodiversity Analysis (CURBA) Model*, University of California - Berkeley, Institute of Urban and Regional Development, 1998.

[43]Jackson, Oregon 2000 population taken from 2000 U.S. Census. Populations for 2005-2020 taken from Oregon Office of Economic Analysis.

[44]Personal communication with Jackson County Planning and Development Department, August 16, 2002.

200. Based on a new population to land area ratio of 4.3 persons per acre in the county, approximately 9,460 additional acres of land will be developed by 2020.

201. A total of 7,600 acres have been proposed for critical habitat in Jackson County. The total overlap between areas of expected urban growth and proposed critical habitat consists of approximately 1,300 acres near the unincorporated town of White City along Highway 227 and in the western portion of the Urban Unincorporated Community Boundary.

### 3.2.13 LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN RIVERSIDE COUNTY

202. The population of Riverside County is projected to increase by 62 percent, or 980,000 people, over the 20-year period ending in 2020.[45] Expected to be the second fastest growing county in the state in the coming decade, Riverside County is part of the densely populated five-county Los Angeles Basin, the region of the state where the supply of land for new home and job sites is the least constrained. Riverside County will continue to receive large flows of new residents from Orange and Los Angeles Counties, as housing prices prove advantageous in comparison to more coastal communities.[46]

203. The CURBA model estimates that urban growth in the county will require approximately 419,000 additional acres of currently rural land by 2020, representing an average new population to land area ratio of 2.3 persons per acre.[47]

204. A total of 10,209 acres have been proposed for critical habitat in Riverside County. The total overlap between areas of expected urban growth and proposed critical habitat consists of approximately 4,300 acres in the southern portion of the San Jacinto Valley near the cities of Hemet and San Jacinto.

### 3.2.14 ESTIMATION OF THE NUMBER OF CONSULTATIONS ASSOCIATED WITH LAND DEVELOPMENT ACTIVITIES

205. Estimates of section 7 consultation activity for private land development projects rely on historical consultation data provided by the Sacramento Fish and Wildlife Office (SFWO). For consultations taking place between 1995 and 2001 and requiring compensation, SFWO data show that the average land development

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[45]State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001.

[46]*California County Projections 2001*, Center for the Continuing Study of the California Economy, pp. 3-32 through 37.

[47]J.D. Landis et al., *Development and Pilot Application of the California Urban and Biodiversity Analysis (CURBA) Model*, University of California - Berkeley, Institute of Urban and Regional Development, 1998.

project size is approximately 300 acres. On a county by county basis, this size factor was combined with projections of the land area of overlap between the likely path of urban growth and proposed critical habitat shown in **Table 5**. Organized by county, **Table 5** shows that 58 development projects will require a formal consultation and biological assessment in the next twenty years.

206. SFWO's 1995-2001 consultation history also indicates that, for every formal consultation initiated for listed vernal pool species, the Service conducts 2.5 technical assistance efforts and 3.0 informal consultations. Using these ratios, **Table 5** also shows the number of technical assistance efforts and informal consultations associated with section 7 activities across the 37 counties. Thus, in addition to the 69 formal consultations associated with private land development under section 7, therefore, the Service will complete 173 technical assistance efforts and 208 informal consultations.

## 3.3 IMPACTS OF SECTION 7 IMPLEMENTATION ON OTHER FEDERAL ACTIVITIES AFFECTING CRITICAL HABITAT UNITS

207. Besides land development, many land uses occurring in critical habitat units involve Federal agency funding or approval. These projects include electric power generation and transmission, water supply and delivery, and forest management and fire suppression, among others. The number of technical assistance activities, formal and informal consultations, and programmatic consultations associated with vernal pool species are covered below. For the purposes of cost estimation, a programmatic consultation will be treated as a formal consultation.

### 3.3.1 MILITARY FACILITIES CONSTRUCTION AND MILITARY TRAINING OPERATIONS

208. Four military bases (all operated by the U.S. Department of Defense) have land that has been included in proposed critical habitat for vernal pool species. Each base hosts a number of training, housing, repair, fueling, armament storage, office and communications facilities, and construction of new facilities or changes in the nature of base operations may require a section 7 consultation with the Service if adverse impacts to vernal pool habitat or the species are possible.

209. Travis Air Force Base, located in Solano County, has staff biologists who have identified the vernal pool habitat and produced resource management strategies used by base management to protect some of the listed vernal pool plant species. Air Force personnel believe that no additional runways or roads are likely to be constructed in the next two decades at Travis, resulting in the need for no additional consultations after critical habitat is designated.[48]

[48]Personal communication with Environmental Specialist, Travis Air Force Base, Solano County, California, February 20, 2002.

**Table 5**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Consultations Associated With Land Development, By County**

| ID | Region or County | Formal Consultations | Informal Consultations | Technical Assistance Efforts |
|---|---|---|---|---|
| | **San Francisco Bay Area** | | | |
| 1 | Alameda | 5 | 15 | 12 |
| 2 | Contra Costa | 0 | 0 | 0 |
| 3 | Napa | 1 | 2 | 2 |
| 4 | Solano | 17 | 52 | 43 |
| | **Subtotal** | **23** | **69** | **57** |
| | **San Joaquin Valley Region** | | | |
| 5 | Fresno | 0 | 0 | 0 |
| 6 | Kings | 0 | 0 | 0 |
| 7 | Madera | 1 | 3 | 2 |
| 8 | Merced | 1 | 3 | 3 |
| 9 | San Joaquin | 0 | 0 | 0 |
| 10 | Stanislaus | 0 | 0 | 0 |
| 11 | Tulare | 1 | 2 | 1 |
| | **Subtotal** | **3** | **8** | **6** |
| | **Mountain Region** | | | |
| 12 | Lassen | 0 | 0 | 0 |
| 13 | Modoc | 0 | 0 | 0 |
| 14 | Plumas | 2 | 5 | 4 |
| 15 | Siskiyou | 0 | 0 | 0 |
| | **Subtotal** | **2** | **5** | **4** |
| | **Upper Sacramento Valley Region** | | | |
| 16 | Butte | 2 | 5 | 4 |
| 17 | Colusa | 2 | 7 | 6 |
| 18 | Glenn | 0 | 0 | 0 |
| 19 | Shasta | 7 | 20 | 16 |
| 20 | Tehama | 0 | 1 | 1 |
| | **Subtotal** | **11** | **33** | **27** |
| | **Sacramento Valley Region** | | | |
| 21 | Placer | 7 | 21 | 17 |
| 22 | Sacramento | 3 | 9 | 8 |
| 23 | Yolo | 0 | 0 | 0 |
| 24 | Yuba | 0 | 0 | 0 |
| | **Subtotal** | **10** | **30** | **25** |
| | **Northern Coast Region** | | | |
| 25 | Lake | 0 | 0 | 0 |
| 26 | Mendocino | 0 | 0 | 0 |
| | **Subtotal** | **0** | **0** | **0** |
| | **Central Coast Region** | 0 | | |
| 27 | Monterey | 2 | 6 | 5 |
| 28 | San Luis Obispo | 4 | 12 | 11 |
| 29 | San Benito | 0 | 0 | 0 |
| | **Subtotal** | **6** | **18** | **16** |
| | **Sierra Nevada Foothills Region** | | | |
| 30 | Amador | 0 | 0 | 0 |
| 31 | Calaveras | 0 | 0 | 0 |
| 32 | Mariposa | 0 | 0 | 0 |
| 33 | Tuolumne | 0 | 0 | 0 |
| | **Subtotal** | **0** | **0** | **0** |

**Table 5**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Consultations Associated With Land Development, By County**

| ID | Region or County | Formal Consultations | Informal Consultations | Technical Assistance Efforts |
|---|---|---|---|---|
| | **Jackson County, Oregon** | | | |
| 34 | Jackson | **3** | **10** | **9** |
| | **Southern California** | | | |
| 35 | Riverside | 12 | 35 | 29 |
| 36 | Santa Barbara | 0 | 0 | 0 |
| 37 | Ventura | 0 | 0 | 0 |
| | **Subtotal** | **12** | **35** | **29** |
| **37 COUNTY AREA GRAND TOTAL** | | **69** | **208** | **173** |

*"Table_1.5"*

Sources: Sacramento Fish and Wildlife Office Data, CURBA Model (J. Landis et al., 1998), and Proposed Designation of Critical Habitat for Vernal Pools Species, September 2002 (66 FR 133).

210. Similarly, Beale Air Force Base, located in Yuba County, has land within proposed critical habitat for vernal pool fairy shrimp and tadpole shrimp. Staff biologists anticipate that the proposed critical habitat will coincide with areas already protected by Beale land management policies.[49] Consequently, no additional consultations are expected for any military activities at this installation.

211. Staff at Fort Hunter Liggett estimate that six new formal consultations and 20 informal consultations will be required in the next 20 years. Fort Hunter Liggett, located on 165,000 acres in southern Monterey County, conducts field training that includes firing ranges and tank squadron maneuvers. The installation's Draft Integrated Natural Resources Management Plan (INRMP) has an endangered species component and the Fort's biologists consulted during the mid-1990s with the Service on several species, including some vernal pool plants and crustaceans.

212. In addition, the installation recently underwent a series of firing range upgrades and modernizations and consulted with the Service on these activities. The majority of future operations at Fort Hunter Liggett, however, are expected to be covered by a programmatic consultation that is nearing completion. Personnel expect that two of the six new consultations will pertain to various activities likely to occur before the conclusion of the programmatic consultation.[50]

213. Camp Roberts staff estimate that 15 formal, 16 informal, and 2 reinitiated formal section 7 consultations will be required in the next 20 years. Camp Roberts is located on 43,000 acres in San Luis Obispo County and Monterey counties and hosts a variety of training and logistics functions for the National Guard and all four branches of the military. In the past, the installation consulted twice with the Service programmatically on military training and training zone maintenance activities. In addition, one informal consultation was held to review burning and grazing practices on the property, one informal consultation occurred when the installation planned to demolish 460 buildings over a five-year period, and a formal consultation was required when McMillan Airfield expanded.

214. After vernal pool critical habitat is designated, personnel at Camp Roberts expect to reinitiate the two programmatic consultation on training and training area maintenance, and over the next two decades, various maintenance, construction, and training activities not addressed in the programmatic consultation will likely require 15 more individual formal consultations and 16 more individual informal consultations under section 7.

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[49]Personal communication with Biologist, Beale Air Force Base, Yuba County, California, May 14, 2002.

[50]Personal communication with Contract Biologist, Fort Hunter Liggett, Monterey County, California, February 6, 2002, and Addendum to the Draft Economic Analyis of Critical Habitat Designation for the Purple Amole and Camatta Canyon Amole, Industrial Economics, Inc., September 2002.

215. The consultations will address the 31 projects planned for the next 20 years at the installation. These projects cover maintenance and new construction within Camp Roberts' catonment area, firing ranges, and other training sites.[51] Because the projects are largely conceptual at this time, no project descriptions or construction schedules are available. For this reason, it is assumed that every project not addressed by programmatic consultations will result in an individual consultation.

### 3.3.2 AIRPORT EXPANSION

216. The Federal Aviation Administration (FAA) estimates that several runway expansion projects that are planned within the next 20 years may overlap with vernal pool critical habitat. The construction of runway extensions has the potential to impact critical habitat if the proposed construction requires vernal pools to be filled or if associated activities (the movement of heavy equipment, surface grading, etc.) disturb the vernal pools themselves or their upland components. Runway expansions constitute a Federal nexus because, on average, 90 percent of construction costs are funded by aviation grants through the FAA, with the remainder paid for by the participating county.

217. In particular, one ongoing expansion and three proposed expansions are likely to result in a total of three formal section 7 consultations and biological assessments with the Service due to the presence of vernal pools. The FAA is currently in the process of initiating a section 7 consultation with the Service due to endangered species other than vernal pool species for the ongoing construction of a runway extension at the Colusa County Airport. Although a formal consultation is already anticipated for this project, the presence of vernal pool critical habitat has the potential to increase the complexity of this consultation and to impose additional administrative or project modification requirements. The FAA has made aviation grants available for three additional future runway extensions within critical habitat boundaries: one at the Turlock Municipal Airport in Merced County, one at Mefford Field in Tulare County, and one at the Chico Municipal Airport in Butte County. FAA personnel anticipate that both of these projects will require formal consultations and biological assessments with the Service due to the presence of vernal pools.

### 3.3.3 RAIL TRANSPORT SYSTEM CONSTRUCTION

218. The Federal Transit Administration (FTA) and the Sacramento Regional Transit District (SacRT) estimate that one formal section 7 consultation will be required in the next 20 years for light rail transportation. SacRT currently has plans to construct a light rail transit maintenance facility on a 40 acre parcel near the town of Rancho Cordova, ten miles east of Sacramento. The project is currently on hold pending environmental findings related to the presence of

[51] Personal communication with Environmental Specialist, Camp Roberts, San Luis Obispo and Monterey Counties, California, January 30, 2002.

wetlands and the elderberry shrub, host plant of the endangered Valley Elderberry Longhorn Beetle. A wetland delineation survey that was conducted as part of the environmental assessment did not identify any vernal pools on the parcel. County maps, however, indicate that the parcel likely overlaps with critical habitat boundaries. Construction of the maintenance facility would be partially funded by FTA grants, which creates a Federal nexus under section 7. SacRT has been involved in formal consultations with the Service in the past regarding the Sacramento light rail transit South Corridor and Folsom Corridor.

219. The Federal Railroad Administration (FRA) and the California High Speed Rail Authority (CHSRA) anticipate that one programmatic formal section 7 consultation and biological assessment will be required in the next 20 years for development of a high-speed rail system in California. The CHSRA is a state agency charged with planning, constructing, and operating a high speed rail system serving California's major metropolitan areas. The proposed rail system would include over 700 miles of track and would serve the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County and San Diego.

220. The CHSRA is currently preparing a program-level EIR/EIS for the high-speed rail system. Although the environmental study phase has not been completed, it is clear that this project has the potential to impact vernal pool critical habitat as it traverses virtually every county south of Sacramento that contains critical habitat for vernal pools. The project is funded both by state funds and by Federal grants from the FRA, which establishes a Federal nexus under section 7. If the project continues following completion of the environmental review phase, it is virtually certain that at least one formal consultation, possibly a large and complex programmatic consultation, and a biological assessment would be required. As a relatively new state agency, the CHSRA has not been involved in any previous section 7 consultations.

### 3.3.4 ROAD SYSTEM CONSTRUCTION AND MAINTENANCE

221. The California Department of Transportation (Caltrans) estimates that nine future highway projects in District 3 (Marysville), District 6 (Fresno), and District 10 (Stockton) will overlap with vernal pool habitat and require formal consultations and biological assessments. In addition, approximately 400 informal consultations will take place across all of Caltrans' districts in the context of discussions with the Service after project site surveys for vernal pool species. Caltrans receives Federal funding from the Federal Highways Administration (FHWA) to perform maintenance and construction of the State's highway system, thus establishing a Federal nexus.

222. Caltrans regional office personnel with knowledge of District 3 estimate that two projects on State Route (SR) 70 in Yuba County, a connection between the Yuba County Amphitheater and SR 65, and maintenance on Highway 149 in Butte County and on Highway 65 in Placer County are all expected to require formal consultation due to vernal pools.[52]

223. Caltrans regional office personnel with knowledge of Districts 6 and 10 estimate that four projects with direct and indirect impacts to vernal pools will result in formal consultations in the Central Valley: State Route 145 in Madera County, State Route 120 in Stanislaus County, State Route 26 in San Joaquin and Calaveras Counties, and State Route 180 in Fresno County. Each consultation would involve the FHWA, Caltrans, and the jurisdictional county.[53]

224. Across all twelve districts, Caltrans headquarters staff cite ongoing activity concerning vernal pool species located on road project sites. During the course of planning each project, Caltrans conducts surveys for vernal pool species on its project sites and reports the results to the Service. This analysis will consider each survey to be an informal consultation. Over the next twenty years, the San Joaquin Region's districts are expected to survey 160 times, the Bay Area Region's districts are expected to survey 80 times, the Southern California Region's districts are expected to survey 20 times, and the Sacramento Valley Region's districts are expected to survey 120 times.[54] In total, the agency will require 400 informal consultations on projects in the next 20 years.

### 3.3.5 CLEAN WATER ACT ENFORCEMENT

225. The EPA shares nationwide enforcement responsibility for provisions of the Clean Water Act with the Army Corps of Engineers. When suspected illegal fill of wetlands occurs in areas of critical habitat and EPA determines that restoration of the affected site will be part of the settlement of the enforcement action, a section 7 consultation with the Service is required. Based on conversations with the EPA, future consultations with the Service are likely to mirror the past consultation history. Personnel in the Region IX Offices of the EPA believe that three formal and three informal vernal pool critical habitat consultations are likely in the coming 20-year period.[55]

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[52]Personal communication with State Highway Planner, California Department of Transportation, District 3 Office, on March 15, 2002.

[53]Personal communication with Biology Branch Chief, Caltrans Central Region, Fresno, CA, September 27, 2002.

[54]Personal communication with ESA Administrator, Caltrans Headquarters Office, Sacramento, California, September 24, 2002.

[55]Personal communication with Wetlands Enforcement Program, EPA Northern California Office, San Francisco, California, February 5, 2002.

### 3.3.6 SUPERFUND PROGRAM IMPLEMENTATION

226. Activities related to the characterization and cleanup of contaminated sites under EPA's Superfund Program may create a Federal nexus for the responsible parties and EPA.[56] If remediation or other assessment measures, such as soil removal, water treatment, or test well drilling, have the potential to adversely modify habitat, a formal consultation and biological assessment will be required under section 7. Based on caseload experience over the past ten years and general knowledge of the distribution of vernal pool habitat, personnel in EPA's Superfund Technical Support Team Office expect that ten formal consultations and biological assessments related to EPA Superfund projects in critical habitat units will take place in the next 20 years.[57]

### 3.3.7 FEDERAL ELECTRIC POWER GRID INTERCONNECTION

227. The Western Area Power Administration (WAPA) markets and delivers hydroelectric power generated by the Bureau of Reclamation, U.S. Army Corps of Engineers, and the International Boundary and Water Commission. Within its service territory of 15 central and western states, WAPA provides the transmission lines and other power grid facilities for 55 hydropower plants with a total capacity of 10,600 megawatts.

228. WAPA is authorized to grant interconnections to its transmission systems. The private entity or Federal agency with the power generating facility submits an application to WAPA and, while systems and facility studies are undertaken prior to the execution of systems and facility agreements, an environmental review process is launched. The application review process provides a Federal nexus for section 7 consultations if adverse impacts may occur to vernal pool habitat. Agency personnel estimate that a total of four informal consultations and five formal consultations with biological assessments will be needed to comply with section 7 over the next 20 years.[58]

### 3.3.8 HYDROPOWER FACILITIES RELICENSING AND CONSTRUCTION

229. The Federal Energy Regulatory Commission (FERC) licenses private and public utility-operated hydropower facilities. Through the licensing process, FERC places conditions on the operations of the dam and power generation facilities to achieve energy supply, safety, and environmental objectives. Historically, the agency has consulted under section 7 for species impacts from transmission lines that connect the hydropower project to the electric grid.

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[56]42 U.S.C. § 9601 et seq. (1980).

[57]Personal communication with Biologist, Ecological Risk Assessment Office, Region IX, San Francisco, California, February 5, 2002.

[58]Personal communication with Biologist, Western Area Power Administration, Denver, Colorado, February 6, 2002.

However, because of a new arrangement between FERC and other Federal landowners, such the Forest Service and the Bureau of Land Management, future FERC consultations on facilities within proposed vernal pool critical habitat will be restricted in scope to the power generation facilities only. The land management agencies will assume responsibility for section 7 consultations involving critical habitat lying underneath power lines or located near other types of utility infrastructure.

230. FERC personnel could recall approximately five previous informal consultations on FERC licensing activities, each resulting in a "no effect" determination made in each of the five biological opinions issued by the Service. As an estimated 25 licenses expire for California hydropower projects over the next 20 years, the agency projects that 10 informal consultations and 18 technical assistance calls to the Service will be required to screen possible impacts to vernal pool habitat.[59]

### 3.3.9 NATURAL GAS PIPELINE FACILITIES RELICENSING AND CONSTRUCTION

231. FERC also licenses the construction and operation of natural gas and oil pipelines if the pipeline crosses state lines. One project, the Kern River Pipeline Expansion, is currently engaged in an informal consultation with the Service concerning vernal pool impacts. The Kern River project is an example of "pipeline loop" construction that utilizes the footprint of the existing gas line to add capacity along the same route. FERC staff believe that all indications point to a "no effect" determination, so that no reinitiation of the consultation process will be necessary after critical habitat designation.

232. Another licensing project proposes to convert a pipeline transporting oil from Texas to Santa Barbara, California (the All American Pipeline) into a facility transporting natural gas instead. This project will also make use of the existing footprint of pipeline facilities, although transport of the natural gas requires installation of compressor stations at periodic intervals. The 10 to 30 acres of land required for each of these structures will also obligate the agency to consult with the service under section 7. FERC expects there to be a single informal consultation for this project's licensing.[60]

### 3.3.10 ELECTRIC POWER TRANSMISSION FACILITIES MAINTENANCE

233. WAPA has also conducted a programmatic consultation related to vernal pools for the broad range of maintenance activities expected on lands adjacent to or beneath WAPA power lines. Agency staff expect that this consultation will

[59]Personal communication with Hydropower Branch Chief, Federal Energy Regulatory Commission, Washington, DC, January 25, 2002.

[60]Personal communication with Oil and Gas Project Manager, Federal Energy Regulatory Commission, Washington, DC, February 5, 2002.

need to be reinitiated after critical habitat designation. In addition, for maintenance activities not addressed in the programmatic consultation, staff expect that four separate informal section 7 consultations and four formal consultations with biological assessments will be required over the next two decades.[61]

### 3.3.11 MUNICIPAL, INDUSTRIAL, AND AGRICULTURAL WATER SUPPLY

234. The Bureau of Reclamation operates dams, power plants, and canals throughout the Western states and expects that section 7 consultations on vernal pool species habitat will be required for maintenance activities on canal rights-of-way, agency participation in power plant construction, and the Bureau's renewal of 40-year water service contracts. Its heavy equipment operations adjacent to canal and pump facilities throughout California's Central Valley have the potential to adversely impact vernal pool habitat, according to personnel in several of the Bureau's area offices. Personnel anticipate that four informal consultations will be required in the 20 years following designation of critical habitat.[62]

235. Secondly, the proposed construction of a power plant in Colusa County that will use Bureau water for cooling purposes may also have vernal pool impacts and could require a single formal consultation and biological assessment on critical habitat issues.[63] Third and last, the activity generating the largest demand for consultations by the Bureau is its authority to enter into long-term water supply agreements with water purveyors located throughout the state. Many of these contracts were established in the 1960s and 1970s, and their staggered renewal over the next 20 years will require a series of formal and informal consultations whenever the contract's service territory overlaps with proposed critical habitat for vernal pools.

236. Bureau personnel expect that approximately 40 contract renewals in the next two decades involve impacts from end uses for the delivered water that are serious enough to require formal consultation and biological assessment under section 7. In the same time period, 30 other contract renewals will likely require informal consultations.[64]

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[61]Personal communication with Biologist, Western Area Power Administration, Denver, Colorado, February 6, 2002.

[62]Personal communication with Environmental Specialists, North Central California and South Central California Area Offices, Bureau of Reclamation, January 23 and 25, 2002.

[63]Personal communication with Environmental Specialist, Northern California Area Office, Bureau of Reclamation, January 25, 2002.

[64]Personal communication with Environmental Specialists, North Central California and South Central California Area Offices, Bureau of Reclamation, January 23 and 25, 2002.

237. The Bureau also participates in several mitigation programs referenced in a programmatic consultation on vernal pool species completed in the last ten years to address land conversion issues. As beneficiaries of Bureau water have converted land out of agricultural use or between agricultural uses, the agency receives funds under the Habitat Restoration Program of the Central Valley Project Improvement Act and under its own Conservation Program to acquire and protect vernal pool habitat. These funds, partially generated through water rate surcharges, are likely to increase above $3 million in the coming years before leveling off. However, the Bureau set up these programs prior to and independent of requirements established through section 7 consultations for any the vernal pool species. As agency staff anticipate that no reinitiation of the programmatic consultation will be necessary in the future, no cost will be attributable to critical habitat designation.[65]

### 3.3.12 TRIBAL LANDS DEVELOPMENT

238. The Natural Resources Branch of the Bureau of Indian Affairs anticipates engaging in one formal consultation and biological assessment with the Service over the proposed construction of a casino on reservation land in the vicinity of Chico, in Butte County. The proposed development consists of a 50,000 square foot gaming casino on approximately 600 acres of land. The BIA would provide Federal funds for trust acquisition on behalf of the Mechoopda Tribe, which would constitute a Federal nexus under section 7. BIA personnel estimate that vernal pools may be present on approximately 400 of the 600 acres, and that these acres may also be occupied by the red-legged frog, a federally listed endangered species. The BIA has already participated in a similar formal consultation over a 49 acre trust acquisition for construction of a casino on the Auburn Rancheria.

### 3.3.13 WILDLIFE REFUGE OPERATIONS

239. The Service manages Stone Lakes National Wildlife Refuge, a 18,200 acre property in Sacramento County that includes land designated as critical habitat for vernal pool species. Many of the refuge's resource management activities have the potential to impact proposed critical habitat. These activities include habitat restoration and creation, cattle grazing, invasive plant species monitoring and control, and construction of public education facilities, and may require section 7 consultations with the Service.

240. As a result of critical habitat designation, personnel assigned to Stone Lakes expect to initiate a programmatic consultation to address the full range of resource management activities planned for the refuge. The programmatic consultation will be able to address critical habitat and species impacts for all resource management activities except for insect and weed control. Because of the resistance that develops in plants and insects targeted for chemical control and the continuous introduction of new herbicide and pesticide products to the end

[65]Personal communication with Environmental Specialist, Regional Office, Bureau of Reclamation, Sacramento, California, January 25, 2002.

user market, a new consultation must be initiated for each new control chemical. Personnel at the refuge estimate that ten new chemicals will be rotated into use in the next 20 years, each requiring a formal consultation and biological assessment.[66]

### 3.3.14 HABITAT CONSERVATION PROGRAM

241. The Service's Habitat Conservation Plan (HCP) branch estimates that 22 informal section 7 consultations will be required in the next 20 years. When newly designated critical habitat overlaps with lands that are regulated under an existing HCP, the Service is required to evaluate the extent to which the existing HCP is protective of the designated critical habitat and to amend the HCP, if necessary, by reinitiating a previous section 7 consultation. The Service's HCP branch estimates that one established HCP will need to be updated to include protections for vernal pool critical habitat.[67] A reinitiated consultation for the San Joaquin multi-species conservation plan would therefore be required under section 7. In essence, this represents an internal consultation within the Service between section 7 and section 10 regulators to ensure that past private party exemptions from the ESA continue to comply with more recent Federal actions.

242. In addition, Service personnel estimate that approximately 20 HCPs currently under preparation might need to be reviewed to determine whether they would be protective of vernal pool habitat as proposed. The administrative process of reviewing all 20 HCPs for completeness is estimated to require approximately ten full days of one staff member's time. Following review, the Service estimated that approximately ten HCPs would ultimately need to be revised, which would require 1 to 2 days effort each, or a total of 15 days. This analysis assumes the administrative effort required for this review process is approximately equivalent to 11 informal section 7 consultations. Service personnel pointed out that revisions in the HCPs are not likely to impose any projection modification costs on the participating parties.

### 3.3.15 FOREST RESOURCE MANAGEMENT

243. There are a number of planned forestry and fire control projects over the next 20 years that have the potential to overlap with vernal pool critical habitat. The projects fall into two main groups as defined by their Federal funding source. The Forestry Branch of the Bureau of Indian Affairs conducts fire control measures on tribal lands using funds from the National Fire Plan, while the Forest Service conducts forestry research projects and maintains management plans that guide the use and protection of forest resources. Both of these Federal funding sources constitute a Federal nexus with respect to section 7.

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[66]Personal communication with Refuge Manager, Stone Lakes National Wildlife Refuge, Sacramento County, California, January 23, 2002.

[67]Personal communication with Division Chief of Conservation Planning, U.S. Fish and Wildlife Service, Sacramento Field Office, February 25, 2002.

244. Fire protection projects carried out by the Forestry Branch of the BIA include habitat alterations such as fuel breaks and roadside brushing that have the potential to impact vernal pool critical habitat. BIA personnel estimate that such activities could result in approximately six individual formal consultations and biological assessments due exclusively to the presence of vernal pool habitat, and another six programmatic consultations that might be required due to the presence of several endangered species, including vernal pool species.[68] The BIA has consulted with the Service several times in the past over fire protection projects in areas containing endangered species and/or critical habitat.

245. The Forest Service's Pacific Southwest (PSW) Research Station estimates that two formal consultations and biological assessments may be required in the next 20 years due to forestry research practices.[69] The PSW Research Station has been involved in one historical section 7 consultation related to research on grazing practices at its San Joaquin range research facility. This consultation, including the preparation of a Biological Analysis, was required due to the presence of both the red legged frog and protected vernal pool species. PSW personnel indicated that both future consultations might also be required due to the presence of multiple protected species, including vernal pool species.

246. Forest Service personnel also indicated that future formal consultations might be required due to the development of management strategies in northern California forests where the Slender Orcutt Grass (*Orcuttia tenuis*) is present, although it was unable to specify how many such consultations would be likely to occur. This analysis assumes that two such management strategies (similar to the Sierra Nevada Forest Plan Amendment) will be developed in the next 20 years, each requiring a formal consultation and biological assessment.

247. In addition, the issuance of grazing allotments and the use, maintenance, and construction of Off Highway Vehicle (OHV) trails would likely result in a number of future consultations due to the presence of Slender Orcutt Grass. Approximately five grazing allotment consultations per year for the next 10 years are anticipated within Lassen, Plumas, and Modoc National Forests. Fifty percent are assumed to be informal and 50 percent are assumed to be formal, neither of which are expected to require biological assessments.

248. Two formal consultations are also expected for OHV road-related issues within critical habitat areas, which would require biological assessments. The Forest Service has been involved in one previous consultation over the

[68]Personal communication with Environmental Compliance Coordinator, Bureau of Indian Affairs, Pacific Region Forestry Branch, February 15, 2002.

[69]Personal communication with Range Conservationist, U.S. Department of Agriculture, Pacific Southwest Research Station, Forestry Services Lab, March 6, 2002.

development of its Sierra Nevada Forest Plan Amendment. The Amendment required one formal consultation with the Service, which was required due to the presence of a number of protected species, including the Slender Orcutt Grass.[70]

## 3.4 SUMMARY OF IMPACTS

249. **Table 6** summarizes the potential for consultations and other impacts on activities affecting the proposed critical habitat designation for vernal pool species in California and Oregon. Importantly, these reflect the total consultation and technical assistance activities associated with the proposed designation, regardless of whether these consultations or assistance calls can be attributed co-extensively to the listing. As a result, these estimates reflect the upper-bound impact associated with the critical habitat designation.

[70]Personal communication with Wildlife Biologist for the Sierra Nevada Framework, March 26, 2002.

**Table 6**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Consultation and Technical Assistance Counts by Activity**

| Consultation Nexus | | Consultation Descriptions | | | | | |
|---|---|---|---|---|---|---|---|
| **Project Owner/Activity** | **Action Agency** | Technical Assistance | Informal Consultations | Informals with 3rd Party [2] | Formal Consultations | Formals with 3rd Party [2] | Biological Assessments [1] |
| **Department of Defense** | | | | | | | |
| Base operations and training | DOD | | 16 | | 19 | | 19 |
| Facilities construction | DOD | | | | 1 | | 1 |
| **State and Local Governments** | | | | | | | |
| Runway extensions | FAA | | | | 4 | **4** | 4 |
| Construction of high speed rail systems | FRRA | | | | 1 | **1** | 1 |
| Construction of transit maintenance facilities | FTA | | | | 1 | **1** | 1 |
| Construction and maintenance of state highways [3] | FHWA | | 400 | **400** | 9 | **18** | 9 |
| Disaster response | FEMA | | | | 6 | **6** | 6 |
| **Public and Private Entities** | | | | | | | |
| Discharge to US waters | EPA | 8 | 3 | **1** | 3 | **1** | 3 |
| Characterization and cleanup of contaminated sites | EPA | 12 | | | 10 | **4** | 10 |
| **Public and Private Utilities; Energy Companies** | | | | | | | |
| Operation of hydroelectric facilities | FERC | 18 | 10 | | | | |
| Authorization to establish an interconnection | WAPA | | 4 | **4** | 5 | **5** | 5 |
| Oil pipeline conversion | FERC | 2 | 1 | | | | |
| **Western Area Power Administration** | | | | | | | |
| Maintenance of power lines | WAPA | | 4 | | 4 | | 4 |
| **Bureau of Reclamation** | | | | | | | |
| Maintenance of water facility ROW | BOR | | 4 | | | | |
| Power plant construction | BOR | | | | 1 | | 1 |
| Water supply and delivery contracts | BOR | | 30 | | 40 | | 40 |
| **Native American Governments** | | | | | | | |
| Fire protection | BIA | | | | 12 | **6** | 12 |
| Casino construction | BIA | | | | 1 | **1** | 1 |
| **Private Landowners** | | | | | | | |
| Land development | ACOE | 173 | 208 | **208** | 69 | **69** | 69 |
| Agricultural conversion | ACOE | | | | | | |
| **Fish and Wildlife Service** | | | | | | | |
| National Wildlife Refuge operations | FWS | | | | 1 | | 1 |
| National Wildlife Refuge mosquito/weed control | FWS | | | | 10 | | 10 |
| Habitat Conservation Program [4] | FWS | | 11 | | | | |
| **Forest Service** | | | | | | | |
| Forestry research | USFS | | | | 2 | | 2 |
| Forest management | USFS | | 25 | | 29 | | 29 |
| **TOTAL** | | **213** | **716** | ***613*** | **228** | ***116*** | **228** |

*"Descriptions"*

Sources: EPS interviews with action agencies, FWS consultation history databases.

[1] The costs of a biological assessment are borne by either the action agency or the third party. It is assumed that each reported biological assessment is a "Level 3" assessment, due to the presence of both plant and crustacean species and large land areas.
[2] The number reported in this column reflects the number of third parties participating across all consultations (for example, if there are three formal consultations and one third party, one third party is assumed to participate in ONE consultation of the three).
[3] Two third parties are assumed for each formal consultation: Caltrans, the state transportation agency, and the local government.
[4] These "consultations" are internal administrative reviews of one previous HCP and twenty ongoing HCPs. As internal consultations, the Action Agency also refers to the Service (Section 10 Branch).

# IV. ESTIMATED COSTS OF THE DESIGNATION OF CRITICAL HABITAT FOR VERNAL POOL SPECIES

250. This section describes the estimated total economic cost of section 7 implementation affecting the areas proposed for designation as critical habitat for vernal pool species over the next 20 years. First, this section defines the types of economic impacts likely to be associated with the proposed area, regardless of whether those impacts can be attributed co-extensively to other causes, such as the listing. Next, utilizing the information presented in Section 3 of this report, the analysis presents the number of technical assistance efforts and consultations, including associated project modifications, that are likely to result from the designation of critical habitat for vernal pool species and/or their listing, as well as the per-unit costs of each of these activities. Based on these estimates, a total cost estimate is derived. Finally, the costs attributable solely to the designation of critical habitat are evaluated.

251. This report assesses the economic impacts associated with potential activities that may affect the proposed critical habitat area. However, the designation of critical habitat and the listing of vernal pool species as threatened or endangered under the Act may impact land use activities in ways that are only partly associated or not associated with section 7. For example, section 9 of the Act prohibits take of an endangered species, and section 10 outlines procedures for completing a habitat conservation plan in order to obtain an incidental take permit from the Service. Economic costs associated with these impacts are included in this analysis only if the activities trigger section 7 technical assistance efforts or consultations.

## 4.1 CATEGORIES OF ECONOMIC IMPACTS ASSOCIATED WITH SECTION 7 IMPLEMENTATION

252. The following section provides an overview of the categories of economic impacts that are likely to arise due to the implementation of section 7 in the area proposed as critical habitat for vernal pool species.

### 4.1.1 TECHNICAL ASSISTANCE

253. Frequently, the Service responds to requests for technical assistance from Federal agencies, private landowners, and developers who have questions regarding whether specific activities will constitute adverse modification of critical habitat and/or require consultation under section 7. For the purposes of this analysis, technical assistance costs represent the estimated economic costs of informational conversations between landowners or developers and the Service regarding the designation of critical habitat for vernal pool species. Our analysis assumes that this type of assistance is provided in instances where a Federal

nexus does not exist or, in the case of a Federal agencies, where there is ultimately no need for a section 7 consultation. The most common type of technical assistance is conversations between municipal or private property owners and the Service regarding lands designated as critical habitat or lands adjacent to critical habitat.

### 4.1.2 SECTION 7 CONSULTATIONS

254. Section 7(a)(2) of the Act requires Federal agencies, in consultation with and with the assistance of the Service, to insure that any action authorized, funded, or carried out by such agency in not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. If a Federal agency determines that a proposed action "may affect" listed species or designated critical habitat, section 7 consultation is required. Consultations are conducted by Service personnel and personnel at the Federal agency responsible for the activity under consideration (referred to as the Action agency). Where a third party is involved, such as a private developer seeking a permit to fill wetlands under section 404 of the Clean Water Act, the Action agency may ask the third party to provide information or to otherwise participate in the consultation process.

255. During a consultation, the Service, the action agency, and the land owner applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, the region where critical habitat has been proposed, and the land owner.

256. Consultations are conducted in a stepwise process. First, if the Action agency determines that a proposed action "may affect" listed species or designated critical habitat, the agency typically requests the initiation of an informal consultation with the Service. Informal consultation is designed to identify and resolve potential concerns at an early stage in the planning process. No further consultation is required if the action agency finds, with the Service's written concurrence, that the proposed action "may affect, but it not likely to adversely affect" listed species or critical habitat.

257. The consultation becomes formal if the action agency determines that the proposed action is likely to adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. Formal consultations determine whether a proposed agency action is "likely" to jeopardize the continued existence of a species (jeopardy) or destroy or adversely modify critical habitat (adverse modification). Formal consultation imposes higher costs on participants than does a consultation that ends at the informal stage.

258. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants. In addition to the administrative costs discussed above, for most formal consultations, the action agency is typically required to prepare a biological assessment document that outlines the potential effects of the proposed action on any listed species and/or designated critical habitat. The process of preparing and reviewing the biological assessment can also represent a significant cost to the applicant, the action agency, and the Service, depending on the scope and complexity of the proposed action and the biological issues at hand.

### 4.1.3 PROJECT MODIFICATIONS

259. The section 7 consultation process may involve some modifications to a proposed project. These modifications may be agreed upon by the action agency and the applicant and included in the project description as avoidance and minimization measures, or they may be included in the Service's biological opinion on the proposed action as discretionary conservation measures to assist the Federal agency in meeting their obligations under section 7 (a)(1) of the Act.[71] Project modifications may also be voluntarily adopted by the applicant in order to streamline the section 7 consultation process, independent of any explicit input or requirements by the Service.

260. In some cases, the Service may determine that the project is likely to jeopardize the continued existence of the species and/or destroy or adversely modify its designated critical habitat. In these cases the Service will include reasonable and prudent alternatives to the proposed project. The reasonable and prudent alternatives are typically developed by the Service in cooperation with the action agency and, when applicable, the applicant. Alternatively, the action agency can develop their own reasonable and prudent alternatives or seek an exemption for the project. All of these project modifications have the potential to represent some cost to the action agency and/or the applicant.

## 4.2 ESTIMATED COSTS OF CONSULTATIONS AND TECHNICAL ASSISTANCE

261. Estimates of the cost of individual consultations and technical assistance were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country. These files addressed consultations conducted for both listings and critical habitat designations. Cost figures were based on an average level of effort for consultations of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.

[71]Section 7(a)(1) requires Federal agencies to utilize their authorities to further the purposes of the Act by carrying out programs for the conservation of listed species.

262. Estimates take into consideration the level of effort of the Service, the action agency, and the applicant during informal consultations, consultations that proceed to the formal stage, and technical assistance, as well as the varying complexity of consultations. Costs associated with consultations include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings and preparing letters, and the development of a biological opinion.

263. Cost estimates for technical assistance are based on analysis of past technical assistance efforts provided by a field office in southern California. Technical assistance costs represent the estimated economic costs of informational conversations, letters, and meetings between third parties or an agency and the Service regarding the designation of critical habitat for the vernal pool species.

264. Per-effort costs associated with formal consultations, informal consultations, and technical assistance calls are presented in **Table 7**. The low and the high scenarios represent a reasonable range of costs for each type of interaction. For example, when the Service participates in technical assistance with a third party regarding a particular activity, the cost of the Service's effort is expected to be approximately $260 to $680. The cost of the third party's effort is expected to be approximately $600 to $1,500.

265. **Table 8** displays the estimates of total consultation costs associated with activities affecting the proposed critical habitat for vernal pool species. The cost estimates were calculated by multiplying the number of expected consultations or technical assistance calls (as described in Section 3 and summarized in **Table 6**) by the per effort cost of these actions. Based on this analysis, the upper-bound total administrative cost of consultations and technical assistance attributable to critical habitat designation for the vernal pool species is estimated to range from $3.6 to $7.1 million. Aside from biological assessment costs, the Service will incur costs ranging from $1.0 million to $2.3 million, and costs for other Federal agencies will range from $1.2 to $2.5 million. Aside from biological assessment costs, costs to the local governments in California and Oregon, private landowners, and private companies are estimated between $580,000 and $1.2 million.

266. The cost of biological assessments may be borne by the Service when it consults on its own activities (e.g., management activities in national wildlife refuges), by the action agency when there is no third party, and by the project applicant (a private company or landowner in most cases) in all other cases. **Table 8** estimates that these groups will spend from $850,000 to $1.2 million on biological assessments as a result of section 7 requirements. **Tables 9** and **10** disaggregate these costs four ways: by action agency, project type, administrative activity, and party responsible for the cost.

**Table 7**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Consultation and Technical Assistance Unit Costs [1]**

| Category | Technical Assistance | | Informal Consultations | | Formal Consultations | |
|---|---|---|---|---|---|---|
| | *Low* | *High* | *Low* | *High* | *Low* | *High* |
| USFWS | $260 | $680 | $1,000 | $3,100 | $3,100 | $6,100 |
| Action Agency | $0 | $0 | $1,300 | $3,900 | $3,900 | $6,500 |
| Third Party | $600 | $1,500 | $1,200 | $2,900 | $2,900 | $4,100 |
| Biological Assessment | $0 | $0 | $0 | $4,000 | $4,000 | $5,600 |

*"Unit_Costs"*

[1] A low to high cost range is specified for each action.

**Table 8**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Consultation and Technical Assistance Cost Summary**

| Category | Technical Assistance | | Informal Consultation | | Formal Consultation [1] | | TOTAL | |
|---|---|---|---|---|---|---|---|---|
| | *Low* | *High* | *Low* | *High* | *Low* | *High* | *Low* | *High* |
| USFWS | $55,441 | $144,999 | $715,881 | $2,219,231 | $707,710 | $1,392,591 | **$1,479,032** | **$3,756,821** |
| Action Agency | $0 | $0 | $930,645 | $2,791,936 | $890,345 | $1,483,909 | **$1,820,990** | **$4,275,844** |
| Third Party | $127,940 | $319,851 | $735,457 | $1,777,355 | $337,252 | $476,804 | **$1,200,649** | **$2,574,010** |
| Biological Assessments | $0 | $0 | $0 | $0 | $913,175 | $1,278,444 | **$913,175** | **$1,278,444** |
| **TOTAL** | **$183,381** | **$464,850** | **$2,381,983** | **$6,788,521** | **$2,848,482** | **$4,631,748** | **$5,413,846** | **$11,885,120** |

*"By_Agency"*

[1] Formal Consultation cost totals include Biological Assessment costs.

**Table 9**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Consultation and Technical Assistance Cost by Activity and Party**

| Consultation Nexus | | Consultation Costs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project Owner/Activity | Action Agency | Fish and Wildlife Service | | Action Agency | | Third Party | | Total | |
| | | *Low* | *High* | *Low* | *High* | *Low* | *High* | ***Low*** | ***High*** |
| **Department of Defense** | | | | | | | | | |
| Base operations and training | DOD | $74,900 | $165,500 | $170,900 | $292,300 | - | - | $245,800 | $457,800 |
| Facilities construction | DOD | $3,100 | $6,100 | $7,900 | $12,100 | - | - | $11,000 | $18,200 |
| **State and Local Governments** | | | | - | - | | | | |
| Runway extensions | FAA | $12,400 | $24,400 | $15,600 | $26,000 | $27,600 | $38,800 | $55,600 | $89,200 |
| Construction of high speed rail systems | FRRA | $3,100 | $6,100 | $3,900 | $6,500 | $6,900 | $9,700 | $13,900 | $22,300 |
| Construction of transit maintenance facilities | FTA | $3,100 | $6,100 | $3,900 | $6,500 | $6,900 | $9,700 | $13,900 | $22,300 |
| Construction and maintenance of state highways [3] | FHWA | $427,900 | $1,294,900 | $555,100 | $1,618,500 | $568,200 | $1,284,200 | $1,551,200 | $4,197,600 |
| Disaster response | FEMA | $18,600 | $36,600 | $23,400 | $39,000 | $41,400 | $58,200 | $83,400 | $133,800 |
| **Public and Private Entities** | | | | | | | | | |
| Discharge to US waters | EPA | $14,380 | $33,040 | $23,600 | $42,400 | $12,900 | $24,600 | $50,880 | $100,040 |
| Characterization and cleanup of contaminated sites | EPA | $34,120 | $69,160 | $63,000 | $98,600 | $34,800 | $56,800 | $131,920 | $224,560 |
| **Public and Private Utilities; Energy Companies** | | | | | | | | | |
| Operation of hydroelectric facilities | FERC | $14,680 | $43,240 | $13,000 | $39,000 | $10,800 | $27,000 | $38,480 | $109,240 |
| Authorization to establish an interconnection | WAPA | $19,500 | $42,900 | $24,700 | $48,100 | $39,300 | $60,100 | $83,500 | $151,100 |
| Oil pipeline conversion | FERC | $1,520 | $4,460 | $1,300 | $3,900 | $1,200 | $3,000 | $4,020 | $11,360 |
| **Western Area Power Administration** | | | | | | | | | |
| Maintenance of power lines | WAPA | $16,400 | $36,800 | $36,800 | $64,000 | - | - | $53,200 | $100,800 |
| **Bureau of Reclamation** | | | | | | | | | |
| Maintenance of water facility ROW | BOR | $4,000 | $12,400 | $5,200 | $15,600 | - | - | $9,200 | $28,000 |
| Power plant construction | BOR | $3,100 | $6,100 | $7,900 | $12,100 | - | - | $11,000 | $18,200 |
| Water supply and delivery contracts | BOR | $154,000 | $337,000 | $355,000 | $601,000 | - | - | $509,000 | $938,000 |
| **Native American Governments** | | | | | | | | | |
| Fire protection | BIA | $37,200 | $73,200 | $70,800 | $111,600 | $41,400 | $58,200 | $149,400 | $243,000 |
| Casino construction | BIA | $3,100 | $6,100 | $3,900 | $6,500 | $6,900 | $9,700 | $13,900 | $22,300 |
| **Private Landowners** | | | | | | | | | |
| Land development | ACOE | $467,732 | $1,184,921 | $540,490 | $1,261,144 | $831,524 | $1,534,854 | $1,839,746 | $3,980,920 |
| Agricultural conversion | ACOE | - | - | - | - | - | - | - | - |
| **Fish and Wildlife Service** | | | | | | | | | |
| National Wildlife Refuge operations | FWS | $3,100 | $6,100 | $7,900 | $12,100 | - | - | $11,000 | $18,200 |
| National Wildlife Refuge mosquito/weed control | FWS | $31,000 | $61,000 | $79,000 | $121,000 | - | - | $110,000 | $182,000 |
| Habitat Conservation Program [4] | FWS | $11,000 | $34,100 | $14,300 | $42,900 | - | - | $25,300 | $77,000 |
| **Forest Service** | | | | | | | | | |
| Forestry research | USFS | $6,200 | $12,200 | $15,800 | $24,200 | - | - | $22,000 | $36,400 |
| Forest management | USFS | $114,900 | $254,400 | $261,600 | $448,400 | - | - | $376,500 | $702,800 |
| **TOTAL** | | **$1,479,032** | **$3,756,821** | **$2,304,990** | **$4,953,444** | **$1,629,824** | **$3,174,854** | **$5,413,846** | **$11,885,120** |

*"Cost Totals"*

Sources: EPS interviews with action agencies, FWS consultation history databases.

**Table 10**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Consultation Costs and Technical Assistance Costs by Activity and Action**

| Consultation Nexus | | Consultation Costs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project Owner/Activity | Action Agency | Technical Assistance | | Informal Consultations | | Formal Consultations | | Biological Assessments | |
| | | *Low* | *High* | *Low* | *High* | *Low* | *High* | *Low* | *High* |
| **Department of Defense** | | | | | | | | | |
| Base operations and training | DOD | - | - | $36,800 | $112,000 | $133,000 | $239,400 | $76,000 | $106,400 |
| Facilities construction | DOD | - | - | - | - | $7,000 | $12,600 | $4,000 | $5,600 |
| **State and Local Governments** | | | | | | | | | |
| Runway extensions | FAA | - | - | - | - | $39,600 | $66,800 | $16,000 | $22,400 |
| Construction of high speed rail systems | FRRA | - | - | - | - | $9,900 | $16,700 | $4,000 | $5,600 |
| Construction of transit maintenance facilities | FTA | - | - | - | - | $9,900 | $16,700 | $4,000 | $5,600 |
| Construction and maintenance of state highways [3] | FHWA | - | - | $1,400,000 | $3,960,000 | $115,200 | $187,200 | $36,000 | $50,400 |
| Disaster response | FEMA | - | - | - | - | $59,400 | $100,200 | $24,000 | $33,600 |
| **Public and Private Entities** | | - | - | - | - | - | - | | |
| Discharge to US waters | EPA | $6,880 | $17,440 | $8,100 | $23,900 | $23,900 | $41,900 | $12,000 | $16,800 |
| Characterization and cleanup of contaminated sites | EPA | $10,320 | $26,160 | - | - | $81,600 | $142,400 | $40,000 | $56,000 |
| **Public and Private Utilities; Energy Companies** | | - | - | - | - | - | - | | |
| Operation of hydroelectric facilities | FERC | $15,480 | $39,240 | $23,000 | $70,000 | - | - | - | - |
| Authorization to establish an interconnection | WAPA | - | - | $14,000 | $39,600 | $49,500 | $83,500 | $20,000 | $28,000 |
| Oil pipeline conversion | FERC | $1,720 | $4,360 | $2,300 | $7,000 | - | - | - | - |
| **Western Area Power Administration** | | | | | | | | | |
| Maintenance of power lines | WAPA | - | - | $9,200 | $28,000 | $28,000 | $50,400 | $16,000 | $22,400 |
| **Bureau of Reclamation** | | | | | | | | | |
| Maintenance of water facility ROW | BOR | - | - | $9,200 | $28,000 | - | - | - | - |
| Power plant construction | BOR | - | - | - | - | $7,000 | $12,600 | $4,000 | $5,600 |
| Water supply and delivery contracts | BOR | - | - | $69,000 | $210,000 | $280,000 | $504,000 | $160,000 | $224,000 |
| **Native American Governments** | | | | | | | | | |
| Fire protection | BIA | - | - | - | - | $101,400 | $175,800 | $48,000 | $67,200 |
| Casino construction | BIA | - | - | - | - | $9,900 | $16,700 | $4,000 | $5,600 |
| **Private Landowners** | | | | | | | | | |
| Land development | ACOE | $148,981 | $377,650 | $727,583 | $2,058,021 | $686,007 | $1,157,204 | $277,175 | $388,044 |
| Agricultural conversion | ACOE | - | - | - | - | - | - | - | - |
| **Fish and Wildlife Service** | | | | | | | | | |
| National Wildlife Refuge operations | FWS | - | - | - | - | $7,000 | $12,600 | $4,000 | $5,600 |
| National Wildlife Refuge mosquito/weed control | FWS | - | - | - | - | $70,000 | $126,000 | $40,000 | $56,000 |
| Habitat Conservation Program [4] | FWS | - | - | $25,300 | $77,000 | - | - | - | - |
| **Forest Service** | | | | | | | | | |
| Forestry research | USFS | - | - | - | - | $14,000 | $25,200 | $8,000 | $11,200 |
| Forest management | USFS | - | - | $57,500 | $175,000 | $203,000 | $365,400 | $116,000 | $162,400 |
| **TOTAL** | | **$183,381** | **$464,850** | **$2,381,983** | **$6,788,521** | **$1,935,307** | **$3,353,304** | **$913,175** | **$1,278,444** |

*"Totals"*

## 4.3 ESTIMATED COSTS OF PROJECT MODIFICATIONS, PRIVATE LAND DEVELOPMENT

267. This analysis provides estimates of the cost of land development-related project modifications that are likely to occur as a result of section 7 consultations for critical habitat designation for vernal pools species. The analysis specifically focuses on:

- The quantity of land development expected during the next 20 years that overlaps with critical habitat designation.
- Project modifications required of these land development activities from section 7 consultations.
- The impact of these project modifications on the value of all affected property.

268. Expected project modifications are based on the record of past informal and formal consultations that involved vernal pool species and, to the extent available, on project-specific information provided by parties familiar with projects currently planned in vernal pool habitat. Other potential land development consultation-related impacts at the regional and city level are evaluated in Section 4.4, Impacts on Cities and Regions.

### 4.3.1 SUMMARY OF KEY ASSUMPTIONS

269. The analysis is based on a number of assumptions. Uncertainties associated with some of these assumptions are discussed in the Executive Summary. Key assumptions include:

- **Land Development and CHD Overlap**. The relevant area for analysis, specifically the area of overlap between land development over the next twenty years and critical habitat designation, is based on projections of the geographic scope of urban growth and land development. The projected overlap is shown under "Gross Acres of Overlap by 2020" in **Table 11**, and totals about 26,400 acres. Section 3 describes the sources of the urban growth projection.
- **Land Development, Developer Avoidance, and Federal Nexus**. The primary federal nexus associated with non-Federal land development is through the 404 permit requirements of the Clean Water Act for vernal pool fill. Some smaller projects within the critical habitat designation are expected to avoid the fill of wetted vernal pools, while some vernal pools will be considered isolated wetlands. Section 7 consultations will not be required in either of these cases. Together these factors are expected to reduce the relevant overlap by about 8,600 acres. The remaining land development acreage requiring

**Table 11**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**County Estimates of Urban Growth Overlap with Proposed Critical Habitat Areas**

| Co. # | County Name | Gross Acres of Overlap by 2020 | | Gross Acres Overlap Following Developer Avoidance (2) | | Gross Acres Overlap with Federal Nexus (3) | | Net Acres Overlap with Fed. Nexus & Avail. For Development (4) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Group A | Group B | Group A | Group B | Group A | Group B | Group A | Group B |
| **San Francisco Bay Area** | | | | | | | | | |
| 1 | Alameda County | 1,851 | 0 | 1,666 | 0 | 1,499 | 0 | 1,124 | 0 |
| 2 | Contra Costa County | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | Napa County | 287 | 0 | 258 | 0 | 232 | 0 | 174 | 0 |
| 4 | Solano County | 5,797 | 701 | 5,217 | 631 | 4,696 | 568 | 3,522 | 426 |
| | **Subtotal** | **7,935** | **701** | **7,142** | **631** | **6,428** | **568** | **4,821** | **426** |
| **San Joaquin Valley Region** | | | | | | | | | |
| 5 | Fresno County | 6 | 0 | 5 | 0 | 5 | 0 | 4 | 0 |
| 6 | Kings County | 8 | 0 | 7 | 0 | 6 | 0 | 5 | 0 |
| 7 | Madera County | 344 | 0 | 309 | 0 | 278 | 0 | 209 | 0 |
| 8 | Merced County | 0 | 471 | 0 | 424 | 0 | 382 | 0 | 286 |
| 9 | San Joaquin County | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | Stanislaus County | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | Tulare County | 193 | 0 | 174 | 0 | 156 | 0 | 117 | 0 |
| | **Subtotal** | **551** | **471** | **496** | **424** | **446** | **382** | **335** | **286** |
| **Mountain Region** | | | | | | | | | |
| 12 | Lassen County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | Modoc County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | Plumas County [5] | 607 | 0 | 546 | 0 | 492 | 0 | 369 | 0 |
| 15 | Siskiyou County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Subtotal** | **607** | **0** | **546** | **0** | **492** | **0** | **369** | **0** |
| **Upper Sacramento Valley Region** | | | | | | | | | |
| 16 | Butte County [5] | 300 | 320 | 270 | 288 | 243 | 259 | 182 | 194 |
| 17 | Colusa County [5] | 230 | 662 | 207 | 596 | 186 | 536 | 140 | 402 |
| 18 | Glenn County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | Shasta County [5] | 2,467 | 0 | 2,220 | 0 | 1,998 | 0 | 1,499 | 0 |
| 20 | Tehama County [5] | 98 | 26 | 88 | 23 | 79 | 21 | 60 | 16 |
| | **Subtotal** | **3,095** | **1,008** | **2,786** | **907** | **2,507** | **816** | **1,880** | **612** |
| **Sacramento Valley Region** | | | | | | | | | |
| 21 | Placer County | 2,736 | 0 | 2,462 | 0 | 2,216 | 0 | 1,662 | 0 |
| 22 | Sacramento County | 515 | 688 | 464 | 619 | 417 | 557 | 313 | 418 |
| 23 | Yolo County | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 24 | Yuba County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Subtotal** | **3,251** | **689** | **2,926** | **620** | **2,633** | **558** | **1,975** | **419** |
| **Northern Coast Region** | | | | | | | | | |
| 25 | Lake County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 | Mendocino County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Subtotal** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

**Table 11**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**County Estimates of Urban Growth Overlap with Proposed Critical Habitat Areas**

| Co. # | County Name | Gross Acres of Overlap by 2020 | | Gross Acres Overlap Following Developer Avoidance (2) | | Gross Acres Overlap with Federal Nexus (3) | | Net Acres Overlap with Fed. Nexus & Avail. For Development (4) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Group A | Group B | Group A | Group B | Group A | Group B | Group A | Group B |
| **Central Coast Region** | | | | | | | | | |
| 27 | Monterey County | 828 | 0 | 745 | 0 | 671 | 0 | 503 | 0 |
| 28 | San Luis Obispo County | 1,619 | 0 | 1,457 | 0 | 1,311 | 0 | 984 | 0 |
| 29 | San Benito County | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Subtotal** | **2,447** | **0** | **2,202** | **0** | **1,982** | **0** | **1,487** | **0** |
| **Sierra Nevada Foothills Region** | | | | | | | | | |
| 30 | Amador County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | Calaveras County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 32 | Mariposa County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 33 | Tuolumne County [5] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Subtotal** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Jackson County, Oregon** | | | | | | | | | |
| 34 | Jackson County, OR [5] | 1,289 | 0 | 1,160 | 0 | 1,044 | 0 | 783 | 0 |
| **Southern California** | | | | | | | | | |
| 35 | Riverside County | 4,328 | 0 | 3,895 | 0 | 3,506 | 0 | 2,629 | 0 |
| 36 | Santa Barbara County | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37 | Ventura County | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Subtotal** | **4,328** | **0** | **3,895** | **0** | **3,506** | **0** | **2,629** | **0** |
| | **Total** | **23,503** | **2,869** | **21,153** | **2,582** | **19,038** | **2,324** | **14,278** | **1,743** |

*"net_acres"*

[1] Based on urban growth estimates based on the CURBA model. Acreage total only includes data for counties for which the CURBA model provides urban growth estimates. See footnote [5].
[2] Assumes ability of developer to modify project to avoid vernal pools will allow development of 10 percent of otherwise undevelopable projects.
[3] Assumes that, due to certain project designs, 10 percent of remaining net acres will not require a Section 404 permit, and no Federal nexus exists.
[4] Assumed 75 percent of land is the net privately developable area. Remainder is public lands, including roads, parks, and schools.
[5] These counties are not included in the CURBA Model and do not have an easily calculated land area for urban growth over 20 years. Alternative methods were applied to determine county sub-area land needs given projected population growth.

section 7 consultations through the 404 permit nexus is shown under "Gross Acres of Overlap with Federal Nexus" in **Table 11**, and totals about 17,800 acres. Sections 4.3.2.1 and 4.3.2.2 describe these assumptions in more detail.

- **Baseline and USFWS Additional Regulatory Requirements.** The primary baseline regulatory requirements of relevance for land development are the restoration requirements associated with the issuance of a 404 permit by the ACOE under the Clean Water Act. As part of the baseline, this regulatory requirement is subtracted from the USFWS conservation requirements to determine the additional regulatory requirements associated with section 7 consultations. Sections 4.3.2.2 and 4.3.2.3 describe this assumption in more detail.

- **Additional USFWS Requirements by Species Group.** The Service requires two different sets of conservation measures for consultations associated with different species and their critical habitat. The two groups of species are Group A (ten species, more frequently occurring) and Group B (five species, less frequently occurring). Group B species require more restrictive conservation measures, including compensation at a six to one on-site preservation/avoidance ratio and a three to one restoration ratio, once the baseline is subtracted. Group A species require a two to one off-site preservation/compensation ratio, once the baseline has been subtracted. Section 4.3.2.4 describes these assumptions in more detail

- **Project Modification Costs/Land Value Losses.** Project modification costs are expressed in terms of land value losses for the purposes of this analysis. Project modifications can include avoidance of certain portions of the land area as well as investments in restoration and compensation efforts. It is assumed that all land on a particular development site has equal development, and thus land, value. As a result, the loss of use of a particular portion of the site will reduce the land value of the site by the same proportion. It is also assumed that the compensation and restoration costs, that directly add to the cost of site development, are internalized into the value of the land, reducing land value at the time of development by the additional development cost.

- **Net Acre Valuation Approach.** Raw, entitled land values are often expressed in terms of value per net acre. The net area of development is the location of private development. The remainder of the gross area includes a range of publicly and/or privately funded infrastructure, including roads, schools, parks and other. The land value to the landowner will occur through the sale or lease of the net areas of development. The infrastructure areas will not provide direct revenue to the landowner, but rather, through their presence, add value to the private development portion of the site. The value added by the infrastructure is generally internalized into the private development value and associated land value and is captured in the per net acre expressions of land value. For the purposes of this analysis, a standard assumption that 25

percent of the land area will be used for infrastructure is applied. As a result, a total of about 13,400 net acres of land development will require section 7 consultations (see **Table 11**).

- **Per Net Acre Land Values**. Reductions in land values associated with section 7 consultation requirements are considered relative to estimates of the current value of land expected to be developed in the next 20 years. Estimates of land values are distinguished by county and by time to development. Variations in the value of land currently entitled and ready for development by county were based on Sacramento County's average net value per raw, entitled acre of $125,000 and relative median housing prices by county. This land value was provided by several prominent development consultants in the region.[72] A relative land value index was derived based on median housing data from RAND and the California Association of Realtors (see **Table 12**), and applied to estimate entitled land value acres for all relevant counties.

  Variations in value of land by time to development were derived using a standard time-value of money approach, where future revenues are discounted into present value terms. A 12 percent annual discount rate was applied to reflect a standard discount rate used by land speculators when purchasing raw unentitled land. For purposes of this analysis, it is assumed that the average development in the next 20 years will happen in 10 years, and entitled land values are thus discounted for 10 years. The average per net acre land values by county for land to be developed in the next 20 years are shown in **Table 12**, "Any Year in Next 20 Years".

- **Mitigation Bank Certification and Credit Pricing**. Mitigation bank prices are used to estimate the project modification costs associated with compensation requirements for Group A species. Conservation banks are presumed to provide a good estimate for the cost of compensation requirements. The largest prevalence of existing conservation banks is in the Sacramento Region, where each compensation credit costs about $60,000 per acre. This compensation cost is used to derive equivalent costs in all counties, where compensation costs are expected to vary in line with land value. Section 4.3.2.4 describes this assumption in more detail.

- **Average Size of Land Development Project**. Land development projects vary significantly in size. Based on prior 404 permit consultations, land development projects have an average project size of 300 acres. This is the average project size considered in this analysis.

[72]EPS Project Experience.

**Table 12**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Per Acre Land Values by County by Period of Development**

| ID | County Name | Value Index [1] | Entitled Land Value if Development Occurs in | | | |
|---|---|---|---|---|---|---|
| | | | First Year | Any Year in Next 20 Years | Any Year in Next 10 Years | Any Year in Second 10 Years |
| 1 | Monterey County | 237 | $296,000 | $123,813 | $187,316 | $60,311 |
| 2 | Napa County | 218 | $273,000 | $114,193 | $172,761 | $55,624 |
| 3 | Alameda County | 206 | $257,000 | $107,500 | $162,636 | $52,364 |
| 4 | San Benito County | 187 | $234,000 | $97,880 | $148,081 | $47,678 |
| 5 | Contra Costa County | 184 | $230,000 | $96,206 | $145,550 | $46,863 |
| 6 | Santa Barbara County | 176 | $220,000 | $92,024 | $139,221 | $44,826 |
| 7 | San Luis Obispo County | 152 | $190,000 | $79,475 | $120,237 | $38,713 |
| 8 | Ventura County | 150 | $188,000 | $78,638 | $118,971 | $38,306 |
| 9 | Placer County | 140 | $175,000 | $73,201 | $110,744 | $35,657 |
| 10 | Solano County | 139 | $174,000 | $72,782 | $110,112 | $35,453 |
| 11 | Lake County | 128 | $160,000 | $66,926 | $101,252 | $32,600 |
| 12 | Mendocino County | 128 | $160,000 | $66,926 | $101,252 | $32,600 |
| 13 | Yolo County | 125 | $156,000 | $65,253 | $98,721 | $31,785 |
| 14 | San Joaquin County | 103 | $129,000 | $53,959 | $81,634 | $26,284 |
| 15 | Sacramento County | 100 | $125,000 | $52,286 | $79,103 | $25,469 |
| 16 | Amador County | 100 | $125,000 | $52,286 | $79,103 | $25,469 |
| 17 | Calaveras County | 100 | $125,000 | $52,286 | $79,103 | $25,469 |
| 18 | Riverside County | 97 | $121,000 | $50,613 | $76,572 | $24,654 |
| 19 | Jackson County, OR | 95 | $119,000 | $49,776 | $75,306 | $24,247 |
| 20 | Stanislaus County | 93 | $117,000 | $48,940 | $74,041 | $23,839 |
| 21 | Butte County | 82 | $103,000 | $43,084 | $65,181 | $20,987 |
| 22 | Colusa County | 82 | $103,000 | $43,084 | $65,181 | $20,987 |
| 23 | Glenn County | 82 | $103,000 | $43,084 | $65,181 | $20,987 |
| 24 | Shasta County | 82 | $103,000 | $43,084 | $65,181 | $20,987 |
| 25 | Tehama County | 82 | $103,000 | $43,084 | $65,181 | $20,987 |
| 26 | Yuba County | 82 | $103,000 | $43,084 | $65,181 | $20,987 |
| 27 | Merced County | 80 | $100,000 | $41,829 | $63,282 | $20,375 |
| 28 | Mariposa County | 80 | $100,000 | $41,829 | $63,282 | $20,375 |
| 29 | Tuolumne County | 80 | $100,000 | $41,829 | $63,282 | $20,375 |
| 30 | Fresno County | 66 | $83,000 | $34,718 | $52,524 | $16,911 |
| 31 | Tulare County | 61 | $77,000 | $32,208 | $48,728 | $15,689 |
| 32 | Kings County | 61 | $77,000 | $32,208 | $48,728 | $15,689 |
| 33 | Lassen County | 60 | $75,000 | $31,372 | $47,462 | $15,281 |
| 34 | Modoc County | 60 | $75,000 | $31,372 | $47,462 | $15,281 |
| 35 | Plumas County | 60 | $75,000 | $31,372 | $47,462 | $15,281 |
| 36 | Siskiyou County | 60 | $75,000 | $31,372 | $47,462 | $15,281 |
| 37 | Madera County | 55 | $68,000 | $28,444 | $43,032 | $13,855 |

*"index"*

Sources: RAND; California Association of Realtors; EPS.

[1] Value index based on average per-square-foot sales price of all homes in last year. Where RAND did not track 'data, based on county assessor data or counties were considered equivalent to other counties.

## 4.3.2 MORE DETAILED EXPLANATIONS OF SELECTED ASSUMPTIONS

### 4.3.2.1 Land Development and Federal Nexus

270. Land development by public and private entities often requires significant levels of Federal agency review and permitting. In nearly every development project that proposes to fill vernal pools as a means of preparing land for building, Clean Water Act regulations require a project applicant to obtain a 404 permit from the ACOE.

271. Land development may take the form of master planned communities, large office parks, public infrastructure extension, developed parkland, small subdivisions of single owner parcels for estate lots, or other project types. Given the evolution of wetlands regulation since the 1970s and the scale at which most planned residential and commercial developments are built, very few with on-site vernal pools are exempt from section 404 regulation today.[73]

272. If development of land within a proposed critical habitat unit is proposed, the project will require a 404 permit from the USACE unless the developer can fully avoid filling the vernal pool through careful project design. This analysis assumes that approximately 10 percent of the total acres of proposed critical habitat will be designed in such a way that no Federal nexus will exist.[74] **Table 11** shows the acreage of critical habitat exempted from section section 7 regulation because of this situation.

273. Section 7 costs for such projects will be zero, unless project applicants pursue the approval of a Habitat Conservation Plan (HCP) in accord with section 10's incidental take provisions. In the case of an HCP, the Service reviews the HCP for consistency with proposed critical habitat designation. Estimates of the number of these consultations and their likely cost impacts are discussed in Chapter 3. Without the need for an HCP, a development project without a Federal nexus does not trigger additional requirements under from section 7.

274. More typically, the project applicant will be required to obtain a 404 permit from the ACOE and a section 7 consultation will likely be initiated with the Service. The following sections outline what additional project modifications may occur through the consultation process and what mitigation is already required of land development activities under the Clean Water Act.

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[73]Personal communication with Chief, Sacramento Valley Office, U.S. Army Corps of Engineers, January 7, 2002.

[74]Based on Census 2000 estimates that 6 percent of all California residents live outside of urban areas where densities would prohibit this design option, and that these non-urban project sites will use more land per person than urban sites.

#### 4.3.2.2 Baseline Regulatory Requirements

275. As detailed in Chapter 2, a recent court decision may change the regulatory approach adopted by the Portland, San Francisco, Sacramento, and Los Angeles offices toward fill activity associated with vernal pools. On January 9, 2001, the U.S. Supreme Court issued a decision in *Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers*. The decision changes the protection given to isolated wetlands under Section 404 of the CWA by ruling that the use of migratory birds to assert jurisdiction over the site exceeded the authority that Congress had granted the ACOE under the CWA.

276. The decision will restrict ACOE jurisdiction to navigable waters, their tributaries, and wetlands that are adjacent to these navigable waterways and tributaries, leaving "isolated" wetlands unprotected by the CWA. Prior to the SWANCC decision, the ACOE had adopted a regulatory definition of "waters of the U.S." that afforded Federal protection for almost all vernal pools.

277. The Portland, San Francisco, and Sacramento districts of the ACOE believe that no more than 10 percent of the population of vernal pools will be affected by the SWANCC decision. The remaining 90 percent of vernal pools possess connectivity to adjacent floodplain, wetland, or stream features, and their proposed fill will require a 404 permit, itself conditional on mitigation measures.[75] It is also conceivable that no more than 10 percent of projects proposing fill of vernal pools in the Riverside County unit will be affected by the SWANCC decision.[76] The reduction in acres of development projects by county is shown in **Table 11**.

278. For each development project not subject to a SWANCC exemption, meetings are held between the project proponent and ACOE officials to negotiate the 404 permit conditions that allow the project to fill or modify wetlands. The outcome of these meetings and the alternatives analysis is that the project must implement a combination of one or more measures to receive the 404 permit: wetlands on-site preservation/avoidance, off-site preservation, or on- or off-site wetlands restoration.

279. The total amount of acres avoided, restored, and preserved off-site depends on the parameters of the development project and the physical characteristics of the project site. Each project presents unique challenges to development and wetlands functioning, and a unique set of avoidance and conservation techniques is required to implement the least damaging practicable project alternative.

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[75]Personal communication with Chief, Sacramento Valley Office, U.S. Army Corps of Engineers, January 7, 2002.

[76]Personal communication with Section 10 Conservation Coordinator, Carlsbad Field Office, U.S. Fish and Wildlife Service, October 24, 2002.

280. Overall, ACOE officials believe that the agency has achieved a minimum of one acre mitigated for each acre of vernal pool wetlands filled. This mitigation policy is sometimes summarized in terms of a ratio, e.g., this kind of project has a mitigation ratio of 1:1. This ratio includes the option of the landowner to avoid the filling of the wetland acres in addition to the options of purchasing or restoring wetlands as mitigation. The 1:1 ratio is likely to remain in place in future regulatory activities, as it is in keeping with the agency's historical policy of a "no net loss" of wetlands in the 404 permitting program.[77]

281. ACOE jurisdiction varies throughout the proposed critical habitat areas in California and Oregon. Four district offices of the agency regulate vernal pools differently, in part because vernal pool characteristics vary by region. In the Los Angeles district of the ACOE does not generally assert jurisdiction over vernal pools occurring within its district, because the pools are more isolated and do not exhibit a hydrologic connection with adjacent hydrological features. In selected areas of vernal pool habitat in Riverside County, however, the Los Angeles district has determined that the impacted wetlands are waters of the United States.

282. These areas include all of the San Jacinto-Hemet proposed critical habitat unit in Riverside County. In all other areas of the district, the history of regulation generally indicates that fill of vernal pools would not require a 404 permit and no baseline cost is imposed. ***Only Riverside County's San Jacinto-Hemet critical habitat unit will only generate a Federal nexus*** when fill of vernal pools is planned by public or private land developers in the Los Angeles district of the ACOE. As described in Chapter 2, officials in that district generally consider vernal pools to be isolated wetlands and not subject to Clean Water Act regulation. Development projects in the Riverside County unit as well as the other three districts are expected to be subject to the 1:1 mitigation requirement as well as the Service's section 7 requirements explained below.

#### 4.3.2.3 USFWS Additional Requirements

283. In a section 7 consultation, the Service may request an applicant for a 404 permit to compensate each wetted acre of vernal pools filled by:

- Restoring an equal acreage of wetted vernal pools on-site (the restoration requirement)

- Preserving a certain number of wetted acres of vernal pools either on- or off-site (the preservation requirement).

284. The Service's restoration requirements are structured to be similar to the "no net loss" requirement of the ACOE, equaling or requiring a greater level of restoration. The Service's preservation requirement represents an additional

[77]Personal communication with Chief, Sacramento Valley Office, U.S. Army Corps of Engineers, January 7, 2002.

component. Chapter 2 of this report briefly describes the two major preservation categories for vernal pools: avoidance or on-site preservation, and compensation or off-site preservation.

285. Development projects may be proposed for land located within a single or within overlapping multiple habitat units for the 15 vernal pool species. The section 7 requirements issued by the Service, however, will vary with the relative abundance of each species. This analysis classifies the two kinds of species with regard to their section 7 options: Group A and Group B. The species with the higher frequency of occurrence will be referred to as belonging to Group A. The species with the lower frequency of occurrence and for which conservation banks are very unlikely to be established will be referred to as belonging to Group B. All land development projects affected by section 7 will be subject to one or the other of these conservation requirements depending on the presence of certain species on the project site.

286. Group B species (as defined in this section) include the Butte County meadowfoam, Colusa grass, Conservancy fairy shrimp, Sacramento Orcutt grass, and Solano grass. Group A species (as defined in this section) include the Contra Costa goldfields, Greene's tuctuoria, hairy Orcutt grass, Hoover's spurge, longhorn fairy shrimp, San Joaquin Valley Orcutt grass, slender Orcutt grass, succulent owls-clover, vernal pool tadpole shrimp, and vernal pool fairy shrimp.

287. For Group B critical habitat units, additional section 7 conservation requirements will consist of avoidance of 85.7 percent of vernal pools on the project site, a condition which allows only 14.3 percent of the project site to be developed. The amount of land area avoided permits the project applicant to achieve the 6:1 preservation/avoidance ratio (six wetted acres preserved for each wetted acre of vernal pools filled). In addition, restoration requirements, over-and-above the baseline, will consist of the creation of vernal pool habitat at the rate of three acres created for each acre of vernal pools filled.[78]

288. For Group A critical habitat units in all locations except for Riverside County, conservation banks will provide a major means of satisfying section 7 conservation requirements. For these species, additional section 7 conservation will consist of off-site preservation (compensation) of one credit of vernal pool habitat for each wetted acre of vernal pools filled by the development project. These preservation credits are purchased at a conservation bank approved by the Service at a price set by the availability of off-site habitat for these species.

289. Riverside County consultations for Group A species do not have additional preservation requirements above the ACOE's 404 permit requirements. However, the Service acts to ensure one of the ACOE conditions, the restoration of vernal pool acreage that usually occurs off-site, is accompanied by measures to enhance the restored pools. That is, soils containing the species on the project site must be

[78]Personal communication with Section 7 Coordinator, Sacramento Fish and Wildlife Office, June 8, 2002.

collected, stored, and then applied to the new site so that healthy populations of the crustaceans are established.[79] This analysis assumes that the cost of this section 7-derived measures is approximately $15,000 per wetted acre of restored vernal pools. This fee is charged by conservation banks for the full restoration process, including the enhancement measures, but was chosen to overestimate and and not underestimate the real cost to the project applicant.

290. **Table 11** shows the expected overlap between land areas expected to be developed in the next 20 years by county with both areas associated with Group A species and areas associated with Group B species. Across both California and Oregon, for land that is likely to urbanize over the next 20 years, nearly 23,500 acres have critical habitat proposed only for Group A species and approximately one-eighth of that amount, or 2,900 acres, have critical habitat proposed for one or more of the Group B species.

#### 4.3.2.4 Conservation Bank Certification and Credit Pricing

291. For projects that are proposed within critical habitat for only Group A species, the Service's additional conservation requirement may be fulfilled by using any one of three mechanisms. In each case, the applicant must locate qualified vernal pool habitat away from the project site, allowing full development of the property. Either the off-site habitat is already owned by the applicant, it is purchased for preservation from another landowner, or it is preserved through the purchase of conservation credits at what is known as a vernal pool conservation bank.

292. Conservation banks formalize a relationship with the Service based on the quality and amount of habitat available to the bank's operator. The owner of the conservation bank places a deed restriction on the property that preserves the land as a conservation area in perpetuity, in return for permission by the Service to sell allocations of the land area as conservation for projects that fill vernal pools or otherwise degrade vernal pool habitat. Long-term monitoring and land management of the property, including fencing, road access, exotic plant control, and grazing, is guaranteed by the establishment of a funding endowment and binding conditions of the sale of credits to project applicants.

293. Based on conversations with conservation bank enterprises in the Sacramento Valley Region and the Service's coordinator of mitigation bank regulation, project applicants are likely to pay $60,000 per preservation credit required to compensate for filling an acre of wetted vernal pools. This analysis allows the price of conservation to vary with the relative land values in each county, given that land cost is one of the key determinants of compensation cost. To allow for this variation, a home price index adjusts the $60,000 price by county before it is applied to activities in a given habitat unit in a given county.

[79]Personal communication with Section 10 Conservation Coordinator, Carlsbad Field Office, U.S. Fish & Wildlife Service, October 24, 2002.

294. Conservation banks are currently not available for projects in every county included in the proposed designation. In general, banks have been in demand and certified by the Service where the greatest number of consultations on land development have occurred, especially in the Sacramento Valley. As future urban growth creates a greater demand for conservation credits for listed species in other regions of California and in Oregon, it is likely that larger numbers of conservation banks will be established to serve each region where critical habitat is proposed.[80]

295. The Service requires a higher preservation ratio (larger amounts of habitat preserved for each acre of habitat destroyed) for projects that preserve vernal pools off-site without using a conservation bank. As discussed in Chapter 2, options for securing preservation off-site without a conservation bank may include the purchase of suitable habitat from another landowner, or the dedication of lands held by the project applicant in another location to preservation. While this analysis recognizes that landowners who possess a less costly solution for preserving vernal pools off-site (such as land purchased at agricultural prices or land purchased many years in advance of the consultation) will do so, the costs applied in this analysis are the full cost of purchasing conservation bank credits, the default conservation strategy. This assumption makes the economic analysis more likely to overestimate than underestimate actual costs related to section 7.

### 4.3.3 SUMMARY OF RESULTS

296. The impact of Section 7 consultations on average land development projects for Group B and A species habitat units are shown in **Tables 13** and **14** respectively, and overall impacts by geography are shown in **Table 15**. Land value loss estimates represent the upper-bound loss estimate as they are losses associated with section 7 consultations, and not all losses are necessarily attributable to critical habitat designation. Results are described in more detail below.

297. ***The average land development project with a federal nexus that overlaps with critical habitat designated for Group A vernal pool species will lose 4.5 percent of its land value.*** **Table 14** shows the metric used to estimate the loss in land value to an average 300 acre site of land that will require a section 7 consultation and overlaps with critical habitat designated for Group A species. In this case, the eventual land developer will be able to develop the whole site but will have to compensate for filling the 10.5 wetted vernal pool acres (assumed to be 3.5 percent of the site). Compensation is required in the form of two credits of compensation for each wetted acre filled, and in the case of Sacramento County will add about $1.25 million in development costs. This development cost will directly reduce the land value at the time of development, and represents about 4.5 percent of total

[80]Based on a minimum 20 year, $25 million credit market active in six regions of California and in Jackson County, Oregon. Actual credit purchase amount is $36.6 million over 20 years (**Table 15**).

**Table 13**
**U.S. Fish & Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Project Modifications for Land Development**
**Group B Critical Habitat in Sacramento County [1]**

| Item | Assumption | Units | Source |
|---|---|---|---|
| **EXPECTED LAND USES [2]** | | | |
| **Size of Development Project** | **300.0** | **gross acres** | U.S. Fish and Wildlife Service |
| *of which* | | | |
| **Vernal Pool Habitat** | **300.0** | **acres** | |
| Wetted area | 10.5 | wetted ]acres | U.S. Fish and Wildlife Service |
| Uplands | 289.5 | dry acres | U.S. Fish and Wildlife Service |
| *of which* | | | |
| **Area to be Developed** | **300.0** | **gross acres** | U.S. Fish and Wildlife Service |
| Public Uses: Roads, Parks, Schools, Other Infrastructure | 75.0 | acres | Economic & Planning Systems |
| Net Acres for Private Development | 225.0 | net acres | Economic & Planning Systems |
| **REGULATORY REQUIREMENTS FOR GROUP B PROJECTS** | | | |
| **Baseline: U.S. Army Corps of Engineers** | | | |
| Restoration Required for 404 permit [3] | *1:1* | ratio of restored acres (wetted) to filled acres (wetted) | U.S. Army Corps of Engineers |
| **Above Baseline: U.S. Fish and Wildlife Service Additional Requirements** | | | |
| Avoidance Required under section 7 [4] | *6:1* | ratio of avoided acres (wetted) to filled acres (wetted) | U.S. Fish and Wildlife Service |
| Restoration Required under section 7 [4] | *3:1* | ratio of restored acres (wetted) to filled acres (wetted) | U.S. Fish and Wildlife Service |
| **Project Land Uses Once Regulatory Requirements are Fulfilled [5]** | **300.0** | **total acres** | |
| Public Uses: Roads, Parks, Schools, Other Infrastructure | 10.7 | acres | Economic & Planning Systems |
| Net Acres for Private Development | 32.1 | net acres | Economic & Planning Systems |
| Acres Avoided: No Development Permitted | 257.1 | acres | U.S. Fish and Wildlife Service |
| *of which* | | | |
| Vernal Pool Wetted Acres Filled | 1.5 | wetted acres | |
| Vernal Pool Wetted Acres Avoided | 9.0 | wetted acres | *6 wetted acres avoided for each acre filled* |
| Vernal Pool Wetted Acres Restored | 4.5 | wetted acres | *3 wetted acres created for each wetted acre filled* |
| **SECTION 7 LAND VALUE IMPACTS FOR GROUP B PROJECTS [6]** | | | |
| **Value of Developable, Entitled Land** | | | |
| Land Value per Net Acre [7], [8] | $125,000 | per net acre | Area Real Estate Development Consultants |
| Acres of Potential Private Development | 225.0 | net acres | |
| **Total Land Valuation per Project** | **$28,125,000** | | |
| **Value of Developable, Entitled Land Once Regulatory Requirements are Fulfilled** | | | |
| Land Value per Net Acre [7], [8] | $125,000 | per net acre | Area Real Estate Development Consultants |
| Acres of Actual Private Development | 32.1 | net acres | |
| **Total Land Valuation per Project** | **$4,018,000** | | |
| **Change in Land Value** | **$24,107,000** | | |

**Table 13**
**U.S. Fish & Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Project Modifications for Land Development**
**Group B Critical Habitat in Sacramento County [1]**

| Item | Assumption | Units | Source |
|---|---|---|---|
| **SECTION 7 LAND VALUE IMPACTS FOR GROUP B PROJECTS, cont.** | | | |
| **Restoration Costs** | | | |
| Price per Wetted Acre of Restored Vernal Pools [9] | $15,000 | per wetted acre | Area Conservation Banks |
| Wetted Acres Restored | 4.5 | wetted acres | |
| **Total Cost to Development** | **$67,500** | | |
| **Total Impact per Project on Land Value [10]** | **($24,174,500)** | | |
| **Total Impact as a Percent of Full Land Value** | **-86.0%** | | |

*"B"*

Source: U.S. Fish & Wildlife Service, Economic & Planning Systems, Inc.

Notes:

[1] Group B critical habitat is the land area within critical habitat units designated for Butte County Meadowfoam, Colusa Grass, Conservancy Fairy Shrimp, Sacramento Orcutt Grass, or Solano Grass. Group A critical habitat is the land area within critical habitat solely designated for any combination of the nine remaining vernal pool species. Sacramento County is chosen for illustrative purposes only. In the larger analysis, land and pool creation prices are allowed to vary by county. This table does not apply to Riverside County consultation activities. See text for that county's likely section 7 requirements.

[2] Expected land uses are for a typical 300 acre development project sited entirely within proposed critical habitat. The vernal pools are assumed to be distributed evenly around the site, with the pools themselves (the wetted area) occupying 3.5% of the land area. Schools, parks, roads, and other public infrastructure require 25% of the land area. For Group B projects, the regulating agencies will not allow development of the entire site. In reality, development projects of many sizes are likely to take place on sites with a variety of vernal pool configurations, and a range of project designs will satisfy section 7 requirements. The parameters in the table were chosen to reflect a project with average characteristics, e.g., the consultation history for the Sacramento Fish & Wildlife Office on vernal pool species suggests that the average project size is 300 acres.

[3] The Clean Water Act gives the Army Corps the authority to regulate fill of all "waters of the United States" and regulation under the Act would apply to projects that propose fill of vernal pools considered jurisdictional by the Corps. Regulatory requirements include an analysis of the least environmentally damaging project alternative, and restoration of one acre of wetted vernal pools for every acre of wetted pools filled by the project. This requirement is also known as the 1:1 restoration ratio. Any loss in private, developable acreage is not calculated in this table as this value loss is part of the regulatory baseline.

[4] Assumes section 7 consultation with U.S. Fish & Wildlife Service will allow limited fill of Group B vernal pools only if there is also on-site avoidance of habitat at the rate of six wetted acres of vernal pools for each wetted acre of pools filled. Also assumes that the Section 7 consultation process will require that four wetted acres of vernal pools be restored for each wetted acre filled. One wetted acre is already covered under baseline regulation, so above baseline additional USFWS regulation requires 3:1 restoration ratio.

[5] Starting from a 300 acre site, the 6:1 avoidance ratio will require that 257.1 acres be set aside without development, in exchange for 42.8 acres of development. Of the 42.8 acres of development, 10.7 acres or 25% will be for public uses, such as schools, parks, and roads. The remaining acreage, 32.1 acres, will be for private development. Of the 10.5 wetted acres of vernal pools in the 300 acre site, 9.0 are protected, while 1.5 acres are filled. This amount of fill must be accompanied by the restoration of 4.5 wetted acres of similar habitat.

[6] The dollar impacts are estimated by considering land value before and after Section 7 regulation.

[7] Per net acre land values are estimated for a project at the stage in which the land has been fully entitled for development in the planning process and is about to be developed. As discussed elsewhere, actual land values per net acre will be lower for land that is earlier in the entitlement and development timeline. In these cases, the value of land must be discounted from the current entitled land value. This analysis provides land value loss estimates for projects that are about to be developed, as well as an associated percent land value loss that can be applied to land at any stage of the development path.

[8] Per net acre land values are applied to the acres for private development. This approach recognizes that no revenues accrue from the public infrastructure portion of the development site. The value-added to the private development by the public infrastructure is, however, internalized into the per net acre land value.

[9] Restoration costs include site preparation, vernal pool inoculation, and long term site protection and monitoring costs.

[10] Assumes that land values internalize the additional costs of development (habitat restoration costs) as well as the inability to develop a portion of the project site. In this case, 85.7% of the project site is undevelopable as a result of section 7 consultations, and 0.3 percent of land value lost is due to additional development costs.

**Table 14**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Project Modifications for Land Development**
**Group A Critical Habitat in Sacramento County [1]**

| Item | Assumption | Units | Source |
|---|---|---|---|
| **EXPECTED LAND USES [2]** | | | |
| **Size of Development Project** | **300.0** | **gross acres** | U.S. Fish and Wildlife Service |
| *of which* | | | |
| **Vernal Pool Habitat** | **300.0** | **acres** | |
| Wetted area | 10.5 | wetted acres | U.S. Fish and Wildlife Service |
| Uplands | 289.5 | dry acres | U.S. Fish and Wildlife Service |
| *of which* | | | |
| **Area to be Developed** | **300.0** | **gross acres** | U.S. Fish and Wildlife Service |
| Public Uses: Roads, Parks, Schools, Other Infrastructure | 75.0 | acres | Economic & Planning Systems |
| Net Acres for Private Development | 225.0 | net acres | Economic & Planning Systems |
| **Vernal Pool Wetted Acres to be Filled** | **10.5** | **wetted acres** | |
| **REGULATORY REQUIREMENTS FOR GROUP A PROJECTS** | | | |
| **Baseline: U.S. Army Corps of Engineers** | | | |
| Restoration Required for 404 permit [3] | *1:1* | ratio of restored acres to filled acres | U.S. Army Corps of Engineers |
| **Above Baseline: U.S. Fish and Wildlife Service Additional Requirements** | | | |
| Compensation Required under section 7 [4] | *2:1* | ratio of compensated acres to filled acres | U.S. Fish and Wildlife Service |
| Resulting Compensation Purchase [5] | 21 | preservation credits | |
| **SECTION 7 LAND VALUE IMPACTS FOR GROUP A PROJECTS** | | | |
| **Value of Developable, Entitled Land** | | | |
| Land Value per Net Acre [6], [7] | $125,000 | per net acre | Area Real Estate Development Consultants |
| Acres of Private Development | 225.0 | net acres | |
| **Total Land Valuation per Project** | **$28,125,000** | | |
| **Preservation Credit Purchases** | | | |
| Price per Credit [8] | $60,000 | per credit | Area Conservation Banks |
| Credits Purchased | 21 | preservation credits | |
| **Total Cost to Development** | **$1,260,000** | | |
| **Total Loss in Land Value per Project [9]** | **($1,260,000)** | | |
| **Total Loss as a Percent of Full Land Value** | **-4.5%** | | |

*"A"*

Source: U.S. Fish and Wildlife Service, Economic & Planning Systems, Inc.

Notes:
[1] Group B critical habitat is the land area within critical habitat units designated for Butte County Meadowfoam, Colusa Grass, Conservancy Fairy Shrimp, Sacramento Orcutt Grass, or Solano Grass. Group A critical habitat is the land area within critical habitat solely designated for any combination of the nine remaining vernal pool species. Sacramento County is chosen for illustrative purposes only. In the larger analysis, land and preservation credit prices are allowed to vary by county. This table does not apply to Riverside County consultation activities. See text for that county's likely section 7 requirements.
[2] Expected land uses are for a typical 300 acre development project sited entirely within proposed critical habitat. The vernal pools are assumed to be distributed evenly around the site, with the pools themselves (the wetted area) occupying 3.5% of the land area. Schools, parks, roads, and other public infrastructure require 25% of the land area. For Group A projects, the regulating agencies will permit development of the entire site once regulatory requirements are satisfied. In reality, development projects of many sizes are likely to take place on sites with a variety of vernal pool configurations, and a range of project designs will satisfy section 7 requirements. The parameters in the table were chosen to reflect a project with average characteristics, e.g., the consultation history for the Sacramento Fish & Wildlife Office on vernal pool species suggests that the average project size is 300 acres.

[3] The Clean Water Act gives the Army Corps the authority to regulate fill of all "waters of the United States" and regulation under the Act would apply to projects that propose fill of vernal pools considered jurisdictional by the Corps. Regulatory requirements include an analysis of the least environmentally damaging project alternative, and restoration of one acre of wetted vernal pools for every acre of wetted pools filled by the project. This requirement is also known as the 1:1 restoration ratio. Any loss in private, developable acreage is not calculated in this table as this value loss is part of the regulatory baseline.

[4] Consultation with the U.S. Fish & Wildlife Service requires that proposed fill of vernal pools be compensated at the rate of two wetted acres of vernal pools for each wetted acre of pools filled, in addition to the same creation requirements as the Clean Water Act. The above baseline section 7 requirement, therefore, is two wetted acres for each acre filled. Projects may fulfill the requirement for compensation by purchasing preservation credits from a conservation bank, purchasing suitable habitat and managing that habitat in perpetuity, or dedicating land already owned by the applicant and having suitable vernal pool habitat.

[5] The compensation option that is least likely to underestimate the costs to the applicant is the purchase of preservation credits from a conservation bank that has been certified by the U.S. Fish & Wildlife Service.

[6] Per net acre land values are applied for a project at the stage where land has been fully entitled for development in the planning process and is about to be developed. As discussed elsewhere, actual land values per net acre will be lower for land that is earlier in the entitlement and development timeline. In these cases, the value of land must be discounted from the current entitled land value. This analysis provides land value loss estimates for projects that are about to be developed, as well as an associated percent land value loss that can be applied to land at any stage of the development path.

[7] Per net acre land values are applied to the acres for private development. This approach recognizes that no revenues accrue from the public infrastructure portion of the development site. The value-added to the private development by the public infrastructure is, however, internalized into the per net acre land value.

[8] A credit is the amount of compensation required by section 7 for filling one acre of wetted pools on the development site.

[9] Assumes that land values internalize the additional costs of development, including preservation credit purchases.

**Table 15**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Lost Land Development Value Associated with Section 7 Project Modifications/Mitigations**

| Co. # | County Name | Net Acres Overlap with Fed. Nexus & Avail. For Development [1] | | Avg. Land Value per Net Acre [2] | Total Land Value of Net Overlap Acres [3] | | Value Loss Due to Section 7 Project Modifications | | | Percent of State |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Group A | Group B | (Next 20 Years) | Group A | Group B | Group A | Group B | Total | Total |
| **San Francisco Bay Area** | | | | | | | | | | |
| 1 | Alameda County | 1,124 | 0 | $107,500 | $120,882,130 | $0 | $5,415,519 | $0 | $5,415,519 | 4.7% |
| 2 | Contra Costa County | 0 | 0 | $96,206 | $24,898 | $0 | $1,115 | $0 | $1,115 | 0.0% |
| 3 | Napa County | 174 | 0 | $114,193 | $19,909,810 | $0 | $891,959 | $0 | $891,959 | 0.8% |
| 4 | Solano County | 3,522 | 426 | $72,782 | $256,315,643 | $30,994,871 | $11,482,941 | $26,641,262 | $38,124,203 | 32.7% |
| | **Subtotal** | **4,821** | **426** | **$97,670** (4) | **$397,132,480** | **$30,994,871** | **$17,791,535** | **$26,641,262** | **$44,432,797** | **38.2%** |
| **San Joaquin Valley Region** | | | | | | | | | | |
| 5 | Fresno County | 4 | 0 | $34,718 | $126,547 | $0 | $5,669 | $0 | $5,669 | 0.0% |
| 6 | Kings County | 5 | 0 | $32,208 | $156,336 | $0 | $7,004 | $0 | $7,004 | 0.0% |
| 7 | Madera County | 209 | 0 | $28,444 | $5,938,968 | $0 | $266,066 | $0 | $266,066 | 0.2% |
| 8 | Merced County | 0 | 286 | $41,829 | $0 | $11,968,603 | $0 | $10,287,467 | $10,287,467 | 8.8% |
| 9 | San Joaquin County | 0 | 0 | $53,959 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| 10 | Stanislaus County | 0 | 0 | $48,940 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| 11 | Tulare County | 117 | 0 | $32,208 | $3,776,336 | $0 | $169,180 | $0 | $169,180 | 0.1% |
| | **Subtotal** | **335** | **286** | **$38,901** (4) | **$9,998,187** | **$11,968,603** | **$447,919** | **$10,287,467** | **$10,735,385** | **9.2%** |
| **Mountain Region** | | | | | | | | | | |
| 12 | Lassen County | 0 | 0 | $31,372 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| 13 | Modoc County | 0 | 0 | $31,372 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| 14 | Plumas County | 369 | 0 | $31,372 | $11,568,379 | $0 | $518,263 | $0 | $518,263 | 0.4% |
| 15 | Siskiyou County | 0 | 0 | $31,372 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| | **Subtotal** | **369** | **0** | **$31,372** (4) | **$11,568,379** | **$0** | **$518,263** | **$0** | **$518,263** | **0.4%** |
| **Upper Sacramento Valley Region** | | | | | | | | | | |
| 16 | Butte County | 182 | 194 | $43,084 | $7,852,014 | $8,375,481 | $351,770 | $7,199,042 | $7,550,813 | 6.5% |
| 17 | Colusa County | 140 | 402 | $43,084 | $6,019,877 | $17,326,777 | $269,690 | $14,893,019 | $15,162,710 | 13.0% |
| 18 | Glenn County | 0 | 0 | $43,084 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| 19 | Shasta County | 1,499 | 0 | $43,084 | $64,569,725 | $0 | $2,892,724 | $0 | $2,892,724 | 2.5% |
| 20 | Tehama County | 60 | 16 | $43,084 | $2,564,991 | $680,508 | $114,912 | $584,922 | $699,834 | 0.6% |
| | **Subtotal** | **1,880** | **612** | **$43,084** (4) | **$81,006,607** | **$26,382,766** | **$3,629,096** | **$22,676,984** | **$26,306,080** | **22.6%** |
| **Sacramento Valley Region** | | | | | | | | | | |
| 21 | Placer County | 1,662 | 0 | $73,201 | $121,668,094 | $0 | $5,450,731 | $0 | $5,450,731 | 4.7% |
| 22 | Sacramento County | 313 | 418 | $52,286 | $16,358,362 | $21,853,501 | $732,855 | $18,783,909 | $19,516,764 | 16.8% |
| 23 | Yolo County | 0 | 1 | $65,253 | $0 | $39,641 | $0 | $34,073 | $34,073 | 0.0% |
| 24 | Yuba County | 0 | 0 | $43,084 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| | **Subtotal** | **1,975** | **419** | **$58,456** (4) | **$138,026,456** | **$21,893,142** | **$6,183,585** | **$18,817,982** | **$25,001,568** | **21.5%** |
| **Northern Coast Region** | | | | | | | | | | |
| 25 | Lake County | 0 | 0 | $66,926 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| 26 | Mendocino County | 0 | 0 | $66,926 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| | **Subtotal** | **0** | **0** | **$66,926** (4) | **$0** | **$0** | **$0** | **$0** | **$0** | **0.0%** |

**Table 15**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Lost Land Development Value Associated with Section 7 Project Modifications/Mitigations**

| Co. # | County Name | Net Acres Overlap with Fed. Nexus & Avail. For Development [1] | | Avg. Land Value per Net Acre [2] | Total Land Value of Net Overlap Acres [3] | | Value Loss Due to Section 7 Project Modifications | | | Percent of State |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Group A | Group B | (Next 20 Years) | Group A | Group B | Group A | Group B | Total | Total |
| **Central Coast Region** | | | | | | | | | | |
| 27 | Monterey County | 503 | 0 | $123,813 | $62,279,427 | $0 | $2,790,118 | $0 | $2,790,118 | 2.4% |
| 28 | San Luis Obispo County | 984 | 0 | $79,475 | $78,166,922 | $0 | $3,501,878 | $0 | $3,501,878 | 3.0% |
| 29 | San Benito County | 0 | 0 | $97,880 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| | **Subtotal** | **1,487** | **0** | **$100,389** (4) | **$140,446,350** | **$0** | **$6,291,996** | **$0** | **$6,291,996** | **5.4%** |
| **Sierra Nevada Foothills Region** | | | | | | | | | | |
| 30 | Amador County | 0 | 0 | $52,286 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| 31 | Calaveras County | 0 | 0 | $52,286 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| 32 | Mariposa County | 0 | 0 | $41,829 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| 33 | Tuolumne County | 0 | 0 | $41,829 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| | **Subtotal** | **0** | **0** | **$47,057** (4) | **$0** | **$0** | **$0** | **$0** | **$0** | **0.0%** |
| **Jackson County, Oregon** | | | | | | | | | | |
| 34 | Jackson County, OR | 783 | 0 | $49,776 | $38,978,259 | $0 | $1,746,226 | $0 | $1,746,226 | 1.5% |
| **Southern California** | | | | | | | | | | |
| 35 | Riverside County [5] | 2,629 | 0 | $50,613 | $133,074,605 | $0 | $1,380,362 | $0 | $1,380,362 | 1.2% |
| 36 | Santa Barbara County | 0 | 0 | $92,024 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| 37 | Ventura County | 0 | 0 | $78,638 | $0 | $0 | $0 | $0 | $0 | 0.0% |
| | **Subtotal** | **2,629** | **0** | **$73,758** (4) | **$133,074,605** | **$0** | **$1,380,362** | **$0** | **$1,380,362** | **1.2%** |
| | **Total** | **14,278** | **1,743** | **$60,739** (4) | **$950,231,324** | **$91,239,381** | **$37,988,983** | **$78,423,695** | **$116,412,678** | **100%** |

*"404_impacts"*

[1] From Table 11.
[2] See Table 15. Represent estimates of residential land value associated with average parcel expected to be developed over next 20 years, on a net per acre basis.
[3] Total land value represents net per acre value multiplied by number of net acres. Value of public uses acreage is internalized into the per net private developable land value.
[4] This is a land value average for the specified geographic area, not a sum of the land values in each region.
[5] Riverside County projects involve only minor section 7 costs: $15,000 per wetted acre of soil removal from project site, storage, and use in establishing newly restored pools on a compensation site.

land value. Given that land values and compensation costs vary equivalently by county and that development costs and revenues will both be discounted at the same rate, the average land value loss will remain the same across counties and time periods.

298. ***The average land development project with a federal nexus that overlaps with critical habitat designated for Group B vernal pool species will lose 86 percent of its land value.*** **Table 13** shows the metric used to estimate the loss in land value to an average 300 acre site of land that will require a section 7 consultation and overlaps with critical habitat designated for one or more Group B species. In this case, the eventual land developer will only be able to develop about 42.8 gross acres of the site (14.3 percent) in order to meet the six to one avoidance requirement. In addition, the eventual land developer will need to meet the additional USFWS restoration requirements for the fill of 1.5 acres of wetted vernal pools, specifically 4.5 acres, or three to one, of restored wetted vernal pools. These requirements will reduce the land value by 86 percent, including a 85.7 percent land value loss associated with restrictions on the use of a similar proportion of the site, and 0.3 percent associated with the additional development costs due to the restoration costs.

299. ***The total land value impact of land development section 7 consultations associated with vernal pool species is $116.4 million, , about 12.8 percent of the pre-section 7 land value of $950 million.*** As shown in **Table 15**, the majority of the land value loss, $78.4 million, is associated with the 1,743 net acre overlap between urban growth with a federal nexus and CHD associated with Group B species, an average land value loss of $45,000 per net acre of overlap. The remainder of the land value loss, $40.6 million, is associated with the 14,278 net acre overlap of urban growth with a federal nexus and CHD associated with Group A species, an average land value loss of $2,700 per net acre of overlap.

300. **Four counties in particular and eleven more generally, primarily in the San Francisco Bay Area, the Sacramento Valley, the Central Valley, and the Central Coast, contain the large majority of land values losses.** As shown in **Table 15**, land values losses are concentrated in five of the ten regions, including the San Francisco Bay Area ($44.4 million), the Upper Sacramento Valley ($26.3 million), the Sacramento Valley ($25.0 million), the San Joaquin Valley ($10.7 million), and the Central Coast ($6.3 million). Losses are even more heavily concentrated by county with four of the 37counties each containing over $10 million in losses and together accounting for 72.5 percent of the total land value losses. These counties include Solano County ($38.1 million), Sacramento County ($19.5 million), Colusa County ($15.2 million), and Merced County ($10.3 million). Eight other counties include land value losses of between one and ten million dollars, including Butte County, Placer County, Alameda County, San Luis Obispo County, Shasta County, Monterey County, Jackson County, Oregon, and Riverside County.

## 4.4 IMPACTS ON CITIES AND REGIONS

301. Land use regulation, whether local, state, or federal, has the potential to have economic impacts at three different levels of geography, including:

- **Site-Specific Effects**: Individual landowners may experience reductions in land value due to the introduction of new land use regulation. These effects are the subject of Section 4.3.

- **Cities/Communities**: Land use regulation can change patterns of development in cities and communities, including the location, type and quantity of development.

- **Region**: Land use regulation can result in a new distribution of development in a region.

302. The impact of critical habitat designation on each community, city or region depends on the location of the proposed critical habitat, the size of the land area affected by proposed critical habitat, and the type of project modifications required. In this analysis, the affected area represents the area of overlap between proposed critical habitat units and the 20-year urban growth area where land development will include a Federal nexus. The overlap associated with all proposed habitat units is quantified in Section 3. The project modifications required, as explained in Section 4.3, have the potential to: (1) for Group B species, reduce total real estate development and increase the costs of development of the site, and (2) for Group A species, increase the costs of development of the site. This section evaluates the potential effects at the level of the city and the region of these section 7 consultations and associated project modifications.

303. It is often hypothesized that the designation of critical habitat has effects at a broader level than on the land values of individual landowners, and, in particular, may result in a redistribution of development and/or a reduction in the quantity of development at the level of a community, city, or region. The likelihood that these factors and their associated effects are of relevance to the critical habitat designation for vernal pool species are evaluated below.

### 4.4.1 GROWTH REDISTRIBUTION

304. The implementation of section 7 after the designation of vernal pool species critical habitat will, to a certain extent, result in a shift in the locations chosen for development from sites within critical habitat units to other areas within the city or regional land supply. As the urban growth models used in this analysis have projected, an overlap of 23,362 gross acres subject with a Federal nexus is expected in the next twenty years between the baseline path of development and vernal pool CHD. About 19,038 of these gross acres are associated with Group A species only, and about 2,324 of these gross acres are associated with one or more Group B species. Implementation of section 7 and associated project modifications will restrict the use of about 85.7 percent or 1,990 acres of the Group B species

overlap, shifting development elsewhere. For Group A species, development may continue in the same location, but, due to the increased costs of development may occur a little later due to the increase in development costs.

305. Section 7 will have an effect on the distribution of growth within a community or city. Prior to critical habitat designation, many potential land developers would have purchased and developed the most profitable sites for growth without consideration of section 7 species issues. With section 7 and critical habitat designation's consideration of endangered species, some growth will be re-distributed to other areas in the community or the city, due either to Group B species-associated development restrictions or a shift in the relative returns between development in Group A habitat areas and other areas outside of CHD.

306. The level of growth re-distribution within a community or city based will depend on the expected direction of urban growth and its overlap with CHD, especially with Species B habitat. About 2,300 acres of the 21,362 gross acres of overlap include Group B habitat units. Over 99 percent of this area is spread between five counties each with over 250 acres of overlap, including Solano County, Merced County, Sacramento County, Butte County, and Colusa County.

307. Overall, the level of growth re-distribution resulting from vernal pool species section 7 consultations within communities or cities will be centered on a small number of these communities and cities. Other than the direct land value losses to individual landowners, as discussed further below, the effects of these re-distributions are not likely to have a large impact due to their relatively small size and the availability of alternative development locations. Some land developers choosing to operate in affected cities and communities may experience slightly lower returns as they re-distribute development projects to what were before "second best" sites.

### 4.4.2 GROWTH REDUCTION

308. It often hypothesized that the designation of critical habitat may result in a reduction in the quantity of development at the level of the community, city, and region. Hypothesized reductions in the quantity of homes or commercial buildings constructed are, in turn, often linked to a variety of broader economic effects, such as the loss of city or regional employment due to the shortage of office or industrial facilities, the exacerbation of affordable housing shortages, and the lost opportunity for tax revenues from new homeowners or commercial building tenants.

309. Growth reductions in a community, city, or region can result from land use regulation, when all of the following occur: (1) land use regulation prevents development in specific areas or significantly alters the economic incentives for development by increasing costs; (2) the size of the area affected by the regulation is significant in size; and, (3) other developable sites within the area are not

available. While (1) may be met in some measure by the implementation of section 7 on vernal pool species critical habitat, (2) is not met for most jurisdictions and (3) is not met.

310. As discussed above, about 1,990 acres of development will be re-distributed in the next twenty years, and an additional 15,500 acres of development will experience somewhat reduced economic incentives for development.

311. This level of re-distribution is, however, small compared to the total urban growth expected at the level of the affected states, regions, and most cities and communities. California's urbanizing 20-year growth area is expected to be well over 1 million acres, about 26,400 acres of which (less than 1 in every 4,000 acres) will fall within proposed designated habitat. For those counties for which countywide growth estimates are available, no county had more than 2.5 percent of its 20-year growth area in Group B habitat units with an expected Federal nexus. Furthermore, overlap with Group A habitat units, which can be developed at higher cost, was 3.5 percent or below of the 20-year growth area for all counties except of Solano and Placer counties.

312. Even in counties, cities, and communities where the overlap is relatively significant, the availability of alternative development sites appears adequate. As a result, no net reduction in growth at the level of cities or regions is expected to occur as the result of section 7 implementation for vernal pool species.

## 4.5 ESTIMATED COSTS OF PROJECT MODIFICATIONS, OTHER ACTION AGENCY PROJECTS

313. The following list includes project modifications that are likely to be included as a part of formal consultations within vernal pool species critical habitat. They are based on the modifications required in past formal consultations and on conversations with the Service and action agencies regarding the types of modifications likely to be required in future formal consultations.

### 4.5.1 FOREST RESOURCE MANAGEMENT

314. The Forestry Branch of the BIA estimated that a number of the Bureau's fire protection projects would be subject to formal consultations related to the designation of vernal pool critical habitat. It was estimated that six individual consultations would be required due solely to vernal pool habitat, and that six additional programmatic consultations would need to address vernal pool habitat. The average total cost of conducting each fire protection project is approximately $70,000. Based on varying degrees of complexity regarding section 7 mitigation measures, BIA personnel estimated that vernal pool critical habitat designation would require project modifications that would increase project costs by approximately 25 percent for four individual consultations and would increase costs by approximately 50 percent for the remaining two individual consultations. The estimated cost of project modifications related to these individual

consultations is therefore approximately $140,000. The BIA expects that the mitigation measure costs would likely stem from complying with the "3:1 mitigation ratio" that the Service has relied upon in previous section 7 consultations involving listed species or critical habitat.[81]

315. The BIA Forestry Branch estimates that total costs for programmatic fire protection project consultations range from $40,000 to $50,000, including administrative and project modification costs. This analysis assumes the project modification cost of each project is $44,355, which is $50,000 minus $5,634 in administrative costs. These project modification costs assume that the tribe would need to hire an outside environmental consultant (using BIA funds) and that an environmental assessment would be required due to vernal pool critical habitat. The programmatic consultations would likely already have been initiated due to the presence of other endangered species but, to avoid underestimating the costs of vernal pool species critical habitat designation, all of the costs are attributed to vernal pool critical habitat designation. The total estimated cost of project modifications for programmatic consultations is $266,000.

316. The U.S. Forest Service's consultation over the Sierra Nevada Forest Plan Amendment resulted only in administrative costs associated with hiring a variety of biological specialists to survey National Forest lands for the presence of protected species. It is therefore assumed that the two future management plan consultations associated with Slender Orcutt Grass will not result in any project modification costs. Forest Service personnel also indicated that approximately 25 informal and 25 formal consultations will be required due to the issuance of grazing allotments on National Forest land. The informal consultations are not assumed to require project modifications, while each formal consultation is assumed to require approximately $9,000 in project modifications, consisting primarily of fencing installation and maintenance. Finally, two future formal consultations are assumed for OHV road-related issues. These consultations are expected to be relatively extensive and to result in approximately $15,000 each in project modification costs related to fencing and habitat avoidance. The total project modification costs for these 27 formal consultations is therefore estimated to be $255,000.[82]

### 4.5.2 TRIBAL LANDS DEVELOPMENT

317. The BIA's Natural Resources Branch has been involved in one formal vernal pool consultation in the past over trust acquisition for a gaming facility. Project modification costs for this previous consultation were approximately $860,000, which included on-site vernal pool mitigation (set aside), off-site vernal pool creation, fees to hire an outside biological consultant, and project infrastructure

[81]Personal communication with Environmental Compliance Coordinator, Bureau of Indian Affairs, Pacifica Region Forestry Branch, February 15, 2002.

[82]Personal communication with Range Conservationist, U.S. Department of Agriculture, Pacific Southwest Research Station, Forestry Services Lab, March 6, 2002.

modifications to avoid vernal pools. Given the similarities between the casino development that resulted in this historical consultation and the casino development proposed by the Mechoopda Tribe, project modification costs for the proposed gaming facility are also estimated to be $860,000. BIA personnel pointed out that the majority of these costs would be borne directly by the Mechoopda Tribe, especially those required to comply with the Service's habitat mitigation requirements.

### 4.5.3 AIRPORT EXPANSION

318. The four future runway extension projects identified by the FAA will all result in both administrative and project modification costs. The FAA has completed at least one vernal pool species consultation related to runway extension, for which the project modification costs were estimated to be approximately $465,000. These costs included a 3:1 mitigation ratio for approximately five acres of impacted pools, as well as associated environmental monitoring and reporting costs.[83] Applying an average cost of $465,000 to the four proposed airport projects results in a total cost of $1,860,000. FAA personnel point out that previous consultation costs are not necessarily an accurate indicator for future costs, as regulatory requirements and costs vary widely on a project-specific basis. With little project-specific information available, however, this analysis considers historical cost information to be the most reliable data source.

319. The additional runway extension project costs are not included in the estimates of section 7 related land development costs in Section 4.3.1, because of the public nature of airport projects. Section 4.3.1 reflects impacts to private land development only.

### 4.5.4 ROAD SYSTEM CONSTRUCTION AND MAINTENANCE

320. Caltrans personnel estimate that at least nine formal consultations will be required due to highway construction and maintenance projects in Districts 3, 6, and 10 over the next 20 years. Caltrans District 3 has been involved in two formal consultations in the past that resulted in project delays and modification costs. Formal consultation for vernal pools has typically resulted in one-year project delays and significant vernal pool mitigation costs. Each of District 3's five proposed projects is expected to result in both project delays and mitigation requirements. However, district personnel were not able to estimate the number of vernal pool acres likely to be affected as a result of these projects.

321. One previous District 3 consultation for State Highway 99 in Butte County required vernal pool mitigation in the form of credits purchased at a conservation bank for approximately $70,000 per credit. Traditionally, Caltrans has discussed its project impacts with the Service using the terms *direct impact* and *indirect impact*

[83]Personal communication with Senior Airport Planner, Federal Aviation Administration, and airport engineering consultant, February 2, 2002 and with Endangered Species Division Chief, Sacramento Fish & Wildlife Office, October 11, 2002.

to better separate the effects of the project's construction activity from effects caused by changed drainage patterns and connectivity between the pools. Assuming each of the five proposed projects disturbs one vernal pool acre directly and one vernal pool indirectly, total project modification costs are estimated at approximately $700,000.[84]

322. The consultations occuring in Districts 6 and 10 since vernal pool species were Federally listed have resulted in Caltrans purchasing a mitigation property known as the Jensen Ranch for $1.5 million. Its 190 acres of vernal pool habitat will supply the agency with section 7 mitigation at an average land cost of $8,000 per acre. The level of administrative costs borne by Caltrans in the allocation of project mitigation credits required by the Service could not be estimated. Using the District 3 estimate of one acre of direct and one acre of indirect impacts per highway project, Districts 6 and 10 will likely pay $64,000 in section 7-related project mitigation costs during the next 20 years for their four proposed projects.[85]

### 4.5.5 MILITARY FACILITIES CONSTRUCTION AND MILITARY TRAINING

323. Staff at Fort Hunter Liggett estimate that six new formal consultations and 20 informal consultations will be required in the next 20 years. The Army Reserve provided cost estimates for certain conservation measures it believes would be necessary to meet the Service's recommendations to protect habitat of other listed species living on military lands such as the purple amole and the Camatta Canyon amole. The measures include additional monitoring requiring the employment of two GS-11 equivalent biologists at a cost of $2.1 million over twenty years, and fencing of protected areas at a total cost of $250,000. The Service believes that similar measures would be anticipated by Fort personnel to protect vernal pool species after critical habitat designation. To potentially overstate, rather than understate costs, this analysis assumes that the actual costs of implementing a revised monitoring protocol and installing fencing will not exceed Fort Hunter Liggett's estimate of $2.35 million over the next ten years. The Service does not necessarily recommend permanent fencing for vernal pool areas.

324. Personnel at Camp Roberts expect to reinitiate the two programmatic consultations on training and training area maintenance after vernal pool critical habitat is designated. In addition, over the next two decades, various maintenance, construction, and training activities not addressed in the programmatic consultation will likely require 15 more individual formal consultations and 16 more individual informal consultations under section 7. Because the projects are largely conceptual at this time and no project descriptions or construction schedules are available, it is not possible to estimate project modification costs.

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[84]Personal communication with Biological Mitigation Coordinator, Caltrans, March 15, 2002.

[85]Personal communication with Biology Branch Chief, Caltrans Central Region, Fresno, CA, September 27, 2002.

325. The outcome of these 31 consultations is not likely to be the discontinuation of all military training at Camp Roberts, an event that the Air National Guard anticipates would result in military equipment relocation, cancellation of capital projects, and regional employment losses. Instead, it is more likely that significant training activities at the installation will be permitted through the outcome of programmatic consultations.[86] In the past, these consultations have permitted larger than normal exercises, the deployment of new military aircraft and land vehicles during exercises, and the construction and operation of new firing ranges. Even if future training missions at Camp Roberts differ from the military's current training needs, training activities are likely to be addressed by section 7 in a similar manner.[87]

### 4.5.6 ESTIMATED TOTAL COSTS OF PROJECT MODIFICATIONS

326. **Table 16** displays the per-effort estimates of total project modification costs associated with all activities affecting critical habitat for vernal pool species except land development projects. Based on this analysis, the upper-bound total cost of modifications attributable to section 7 based on the presence of vernal pool species and proposed critical habitat is estimated at $4.1 million.

## 4.6 TOTAL SECTION 7 COSTS ASSOCIATED WITH DESIGNATION OF CRITICAL HABITAT

327. The cost estimates presented in **Table 17** are a function of the assumed number of technical assistance, consultations, and project modifications associated with activities affecting the proposed critical habitat for vernal pool species. Based on this analysis, the total section 7 costs associated with the proposed critical habitat designation and the associated listings of the vernal pool species may range from $128.3 to $134.8 million. On an annualized basis, these costs range from $6.4 to $6.7 million per year.

328. While the total economic costs associated with the designation of critical habitat and the associated listing impacts appear to be high, they must be considered in the context of the value of the economic activity that is predicted to occur over the next 20 years in the regions. The value of new residential and non-residential construction in the 36 California counties listed in the proposed

[86]Correspondence dated July 1, 2000, from Lieutenant Colonel Lawrence A. Kimmel, Commanding Officer, California Army National Guard Headquarters, Camp Roberts, California.

[87]Personal communication with Field Biologist, U.S. Fish and Wildlife Service, Ventura, California, July 22, 2002.

**Table 16**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Project Modification Costs, Excluding Private Land Development**

| Project Owner/Activity | Action Agency | Number of Consultations Requiring Modifications | Project Modification Costs Per Effort | Project Modification Cost Total | Party Paying for Modifications |
|---|---|---|---|---|---|
| **State and Local Governments** | | | | | |
| Runway extensions | FAA | 4 | $465,000 | $1,860,000 | Local government |
| Construction and maintenance of state highways | FHWA | 9 | variable | $764,000 | Local government |
| **Native American Governments** | | | | | |
| Fire protection | BIA | 6 | variable | $406,000 | Tribe |
| Casino construction | BIA | 1 | $860,000 | $860,000 | Tribe |
| **Forest Service** | | | | | |
| Forest management | USFS | 27 | variable | $255,000 | USFS |
| **TOTAL** | | **47** | | **$4,145,000** | |

*"Project_Mods"*

Sources: Action agencies and U.S. Fish and Wildlife Service.

**Table 17**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Total Costs Associated with the Implementation of Section 7**

| Critical Habitat Impact Activity/Project Type (Agency) | Cost Range | Costs to the Service | Costs to the Action Agencies | Costs to the Third Parties | Total Section 7 Costs |
|---|---|---|---|---|---|
| **Consultations and Technical Assistance** | | | | | |
| Technical Assistance | *low* | $55,441 | | $127,940 | **$183,381** |
| | *high* | $144,999 | | $319,851 | **$464,850** |
| Informal Consultations | *low* | $715,881 | $930,645 | $735,457 | **$2,381,983** |
| | *high* | $2,219,231 | $2,791,936 | $1,777,355 | **$6,788,521** |
| Formal Consultations | *low* | $707,710 | $890,345 | $337,252 | **$1,935,307** |
| | *high* | $1,392,591 | $1,483,909 | $476,804 | **$3,353,304** |
| Biological Assessments | *low* | | | | **$913,175** |
| | *high* | | | | **$1,278,444** |
| **Subtotal, Consultations [1]** | ***low*** | **$1,479,032** | **$1,820,990** | **$1,200,649** | **$5,413,846** |
| | ***high*** | **$3,756,821** | **$4,275,844** | **$2,574,010** | **$11,885,120** |
| **Project Modifications** | | | | | |
| Land Development (ACOE) | | | | $116,412,678 | **$116,412,678** |
| Base Operations and Training (DOD) | | | $2,350,000 | | **$2,350,000** |
| Runway extensions (FAA) | | | | $1,860,000 | **$1,860,000** |
| Construction and maintenance of state highways (FHWA) | | | | $764,000 | **$764,000** |
| Fire protection (BIA) | | | | $406,000 | **$406,000** |
| Casino construction (BIA) | | | | $860,000 | **$860,000** |
| Forest management (USFS) | | | $255,000 | | **$255,000** |
| **Subtotal, Project Modifications** | | | **$2,605,000** | **$120,302,678** | **$122,907,678** |
| **TOTAL** | ***low*** | **$1,479,032** | **$4,425,990** | **$121,503,327** | **$128,321,524** |
| | ***high*** | **$3,756,821** | **$6,880,844** | **$122,876,687** | **$134,792,797** |

*"Total"*

Sources: Action agencies and U.S. Fish and Wildlife Service.

[1] Biological Assessment costs are reflected in the Total section 7 column only.

critical habitat designation, for example, was $19 billion in 2000.[88] Land on which these projects were built may have sold for as little as $3 billion and as much as $6 billion.[89]

329. Expressed as a percent of the value of new construction for 2000, in the 36 county area, the one-year mean total section 7 cost associated with the proposed designation is less than 0.01 percent of total constructed value. As a percent of the land transaction value used in these projects, the one-year total section 7 cost associated with the proposed designation is less than 0.03 percent of total estimated land value.

## 4.7 SOURCES OF UNCERTAINTY

330. The impacts estimated in this analysis are subject to several sources of uncertainty in the assumptions made about activities likely to take place in critical habitat and how these activities change after critical habitat designation. The effect of each uncertain variable on the analysis is described below in order of declining importance to the results:

- **Credits for Open Space or Other Development Requirements:** The analysis assumes that any preservation of habitat in a land development project, such as a specific plan for a part-residential and part-commercial project, is a land use restriction unrelated to requirements of any other land use regulatory authority, such as a city government. In other words, the assumption is that compensation required by the Service cannot be used by the developer in other project review processes to satisfy local conditions governing new development. This assumption will likely overestimate the cost impact of critical habitat designation, in that projects may receive credit for vernal pool preservation as a public use that would have been required by land dedication to parks or other open space corridors in the absence of any Endangered Species Act regulation. However, the magnitude of this overestimation requires detailed study of numerous local development approval processes and could not be addressed in this analysis.

- **Twenty Years of Urban Growth:** The analysis relies on multi-county growth models and specific area growth analysis in order to predict what land areas become urbanized over the next 20 years. However, the rate of this growth and its precise location are highly dependent on economic conditions, development trends, and the timing of planning processes and real estate transactions. Cities do not simply grow outward geographically, as

[88] *California Statistical Abstract*, October 2001, California State Department of Finance, accessed August 28, 2002, at http://www.dof.ca.gov/HTML/FS_DATA/stat-abs/toc.htm

[89] Assumes that the price of finished homes and commercial buildings includes a 15-30 percent land value component and a 55-65 percent construction cost component.

development projects on undeveloped land require participating landowners, approvals from land use authorities, and sufficient demand for the product or they do not occur. These variables cannot be predicted for any future period of time, although some variables are likely to occupy a limited range of values in the next one to three years. It is not clear how the methods and growth models used in this analysis are likely to underestimate or overestimate the results.

- **Project Footprint and Vernal Pool Geometry:** Implicit in the assumptions about project modifications required of land developers is an average project geometry containing a fixed amount of wetted vernal pool acreage and, in some cases, a corresponding amount of vernal pool upland that must be kept intact to avoid adverse impacts to the listed species. In actual section 7 usage, these geophysical measurements differ for each project site and change the course of the consultation or technical assistance. It is not clear whether the average assumptions adopted by the analysis bias the results upwards or downwards, as examples can be found of a wide range of habitat impacts for the same size of project footprint.

- **Action Agency Uncertainty:** Numerous federal agencies that appear in the Service's consultation history of vernal pool species were asked about the likelihood of future consultations after critical habitat is designated. Biologists in the agencies were often familiar with vernal pool habitat but did not know what lands were destined for proposed designation by the Service, because the proposed rule had not yet been published in the Federal Register. Their answers to questions about likely regulatory impacts depend on their perceptions of the likely boundaries of the proposed critical habitat designation in relation to their perception of the extent of vernal pool habitat within areas likely to contain the agency's future project sites. Their answers also depend on their understanding of thresholds for consultations due to potential impacts to critical habitat. It is difficult to say whether agency personnel are likely to underestimate or overestimate these impacts.

- **Non-Residential Land Uses:** This analysis bases its project modification costs on prices paid for residential land uses, including one data series on home prices and another estimating the prices paid for entitled, developable land approved for residential construction. However, urbanization in a region typically includes other land uses besides residential, such as land approved for industrial, retail, or office construction. The entitled land values for these non-residential uses vary by region but are likely to be different from residential values. Depending on local market conditions for each of the 37 counties, the section 7 costs estimated in this analysis could overstate or understate actual costs.

- **Consultation History:** For many activities of the action agencies, the historical record on consultations and technical assistance contributed to the estimate of future consultations and project modifications to be performed by the agencies or third parties. However, this historical record has been strongly

influenced by agency activities that may not be annually reoccuring, or that may not have shifted since the 1995-2001 time period that defines the consultation and technical assistance database obtained from the Service. For instance, Central Valley Project consultations that span dozens of entries in the historical record for San Joaquin Valley Counties do not themselves indicate a probably level of future consultations with the Bureau of Reclamation. Where possible, action agency personnel elaborated on the specific project inventory likely to generate a federal nexus under section 7.

## 4.8 ECONOMIC IMPACTS ASSOCIATED SOLELY WITH THE DESIGNATION OF CRITICAL HABITAT

331. This section estimates the fraction of the total costs associated with the designation of critical habitat that are not attributable to the listing of vernal pool species. In other words, these are the economic impacts associated solely with critical habitat designation. It concludes with a brief discussion of stigma impacts on land values.

332. The cost estimates presented in **Table 17** are an indication of the total costs that may be associated with implementation of section 7 requirements over the next 20 years, including protections pursuant to both the jeopardy and adverse modification provisions of section 7. As noted in the Preface and Chapter 1, significant overlap exists between the economic implications of listing and critical habitat designation (i.e., application of jeopardy versus adverse modification provisions of the Act). By reporting estimates of total section 7 impacts, the analysis ensures that all of the potential critical habitat impacts are captured.

333. This methodology may, however, capture some impacts that would have occurred in the absence of critical habitat designation, and thus may overstate the effects attributable to the designation. In fact, the listing of the vernal pool species is likely to trigger a portion of the impacts presented in the above analysis. For the following two reasons, it is expected that many consultations would occur absent critical habitat designation:

- The consultation history in the 37 counties since the listing of vernal pool species indicates that the Service has consulted on the same range of activities in the absence of critical habitat designation. The records for the period of 1995 through 2001 from one field office covering 27 of these counties indicate a very large program of more than 1,800 technical assistance activities, informal consultations, and formal consultations, of which ACOE and Bureau of Reclamation activities have the largest share of Service consultations.

- Consultations between the Service and landowners occur because of the presence of vernal pools and the presumed presence of vernal pool species on the property. To obtain conclusive evidence that species do not inhabit a property's wetlands, landowners must follow a multi-year survey protocol. Because of the time and expense that is required to conduct such a survey,

landowners choose to proceed as if vernal pool species are present. Hence, for projects containing vernal pool features where the presence of listed species is uncertain, landowners and relevant action agencies have historically consulted with the Service to avoid possible section 7 violations or illegal take of listed species. Critical habitat designation is not likely to change this practice.

334. The designation of critical habitat, however, is likely to provide helpful information relative to land development projects in counties that are underrepresented in the consultation history for these species. For several counties with large amounts of proposed critical habitat, population growth over the past decade has resulted in only a small number of consultations. Other counties with similar habitat resources and growth are represented with significantly larger numbers of consultations. Aside from other factors, the demand for urbanized land generated by population growth should be generally associated with a larger number of vernal pool species consultations with the Service.

335. This analysis assumes that by virtue of the Service's full rulemaking process, from the publication of the draft rule on vernal pool species critical habitat, to the public comment period, to the final designation, and finally to the regulation's implementation, counties underrepresented in the consultation history will in the future be represented in proportion to the recent rate of population growth in each county. The difference between actual rates of consultations in these counties during the 1995-2001 time period and each county's expected "full representation" rate of consultation with the Service constitutes the share of impacts due solely to critical habitat.

336. **Table 18** shows the total costs of technical assistance calls, informal and formal consultations, and project modifications for private development projects attributable solely to critical habitat designation. The value of these impacts were calculated based on the difference between the county's share of the 15 species' consultation history and the county's share of population growth for the same period of time. Counties for which a high percentage of the total consultations is attributed solely to critical habitat were the most underrepresented in the consultation history compared to the expected amount.

337. Across all 37 counties, more than 75 percent of the technical assistance efforts, section 7 consultations, and project modifications are likely to occur over the next 20 years even if critical habitat is not designated. In other words, these impacts can be attributed co-extensively to the listing of the species. It is estimated that for private land development activities for which the ACOE is the action agency, 12 of the 69 consultations, or about 17 percent of the total, would be triggered solely by critical habitat designation. The value of these activities and the project modifications associated with them is estimated to be $22.4 million, or about 19 percent of the total cost.

**Table 18**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Portion of Land Development Costs Attributable to Critical Habitat [1]**

| ID | Region or County | 20 Year Total Consultation Costs | | Total Land Value Loss | TOTAL COST [2] | Percent Attributable to Critical Habitat | Total Costs Attributable to Critical Habitat |
|---|---|---|---|---|---|---|---|
| | | low | high | | | | |
| | **San Francisco Bay Area** | | | | | | |
| 1 | Alameda | $131,100 | $283,600 | $5,415,500 | $5,622,900 | 90% | $5,060,600 |
| 2 | Contra Costa | $0 | $100 | $1,100 | $1,200 | 90% | $1,100 |
| 3 | Napa | $20,300 | $44,000 | $892,000 | $924,200 | 0% | $0 |
| 4 | Solano | $460,100 | $995,500 | $38,124,200 | $38,852,000 | 44% | $17,094,900 |
| | **Subtotal** | **$611,500** | **$1,323,200** | **$44,432,800** | **$45,400,300** | | **$22,156,600** |
| | **San Joaquin Valley Region** | | | | | | |
| 5 | Fresno | $400 | $900 | $5,700 | $6,400 | 0% | $0 |
| 6 | Kings | $600 | $1,200 | $7,000 | $7,900 | 0% | $0 |
| 7 | Madera | $24,300 | $52,700 | $266,100 | $304,600 | 0% | $0 |
| 8 | Merced | $33,300 | $72,200 | $10,287,500 | $10,340,300 | 0% | $0 |
| 9 | San Joaquin | $0 | $0 | $0 | $0 | 78% | $0 |
| 10 | Stanislaus | $0 | $0 | $0 | $0 | 91% | $0 |
| 11 | Tulare | $13,700 | $29,600 | $169,200 | $190,900 | 0% | $0 |
| | **Subtotal** | **$72,300** | **$156,600** | **$10,735,500** | **$10,850,100** | | **$0** |
| | **Mountain Region** | | | | | | |
| 12 | Lassen | $0 | $0 | $0 | $0 | 0% | $0 |
| 13 | Modoc | $0 | $0 | $0 | $0 | 0% | $0 |
| 14 | Plumas | $43,000 | $93,000 | $518,300 | $586,300 | 0% | $0 |
| 15 | Siskiyou | $0 | $0 | $0 | $0 | 0% | $0 |
| | **Subtotal** | **$43,000** | **$93,000** | **$518,300** | **$586,300** | | **$0** |
| | **Upper Sacramento Valley Region** | | | | | | |
| 16 | Butte | $43,900 | $95,000 | $7,550,800 | $7,620,300 | 0% | $0 |
| 17 | Colusa | $63,200 | $136,700 | $15,162,700 | $15,262,700 | 0% | $0 |
| 18 | Glenn | $0 | $0 | $0 | $0 | 0% | $0 |
| 19 | Shasta | $174,700 | $377,900 | $2,892,700 | $3,169,000 | 0% | $0 |
| 20 | Tehama | $8,800 | $19,000 | $699,800 | $713,700 | 0% | $0 |
| | **Subtotal** | **$290,600** | **$628,600** | **$26,306,000** | **$26,765,700** | | **$0** |
| | **Sacramento Valley Region** | | | | | | |
| 21 | Placer | $185,900 | $402,200 | $5,450,700 | $5,744,800 | 0% | $0 |
| 22 | Sacramento | $85,200 | $184,300 | $19,516,800 | $19,651,600 | 0% | $0 |
| 23 | Yolo | $100 | $200 | $34,100 | $34,300 | 73% | $25,000 |
| 24 | Yuba | $0 | $0 | $0 | $0 | 0% | $0 |
| | **Subtotal** | **$271,200** | **$586,700** | **$25,001,600** | **$25,430,700** | | **$25,000** |
| | **Northern Coast Region** | | | | | | |
| 25 | Lake | $0 | $0 | $0 | $0 | 0% | $0 |
| 26 | Mendocino | $0 | $0 | $0 | $0 | 73% | $0 |
| | **Subtotal** | **$0** | **$0** | **$0** | **$0** | | **$0** |
| | **Central Coast Region** | | | | | | |
| 27 | Monterey | $58,600 | $126,800 | $2,790,100 | $2,882,800 | 0% | $0 |
| 28 | San Luis Obispo | $114,600 | $248,000 | $3,501,900 | $3,683,200 | 0% | $0 |
| 29 | San Benito | $0 | $0 | $0 | $0 | 64% | $0 |
| | **Subtotal** | **$173,200** | **$374,800** | **$6,292,000** | **$6,566,000** | | **$0** |

**Table 18**
**U.S. Fish and Wildlife Service**
**Vernal Pool Species Critical Habitat Designation Economic Analysis**
**Portion of Land Development Costs Attributable to Critical Habitat [1]**

| ID | Region or County | 20 Year Total Consultation Costs | | Total Land Value Loss | TOTAL COST [2] | Percent Attributable to Critical Habitat | Total Costs Attributable to Critical Habitat |
|---|---|---|---|---|---|---|---|
| | | low | high | | | | |
| | **Sierra Nevada Foothills Region** | | | | | | |
| 30 | Amador | $0 | $0 | $0 | $0 | 61% | $0 |
| 31 | Calaveras | $0 | $0 | $0 | $0 | 69% | $0 |
| 32 | Mariposa | $0 | $0 | $0 | $0 | 0% | $0 |
| 33 | Tuolumne | $0 | $0 | $0 | $0 | 0% | $0 |
| | **Subtotal** | **$0** | **$0** | **$0** | **$0** | | **$0** |
| | **Jackson County, Oregon** | | | | | | |
| 34 | Jackson | $91,300 | $197,500 | $1,746,200 | $1,890,600 | 0% | $0 |
| | **Southern California** | | | | | | |
| 35 | Riverside | $306,400 | $663,000 | $1,380,400 | $1,865,100 | 0% | $0 |
| 36 | Santa Barbara | $0 | $0 | $0 | $0 | 0% | $0 |
| 37 | Ventura | $0 | $0 | $0 | $0 | 0% | $0 |
| | **Subtotal** | **$306,400** | **$663,000** | **$1,380,400** | **$1,865,100** | | **$0** |
| **37 COUNTY AREA GRAND TOTAL [3]** | | **$1,839,700** | **$3,980,900** | **$116,412,800** | **$119,323,100** | | **$22,181,600** |

*"CH Portion2"*

Sources: USFWS and California State Department of Finance

[1] Outside of land development activities, there is not likely to be additional cost attributable solely to critical habitat designation.
[2] Reflects the average of the low and high range of consultation costs.
[3] Totals may not equal the sum of the county costs due to rounding.

338. These estimates apply only to ACOE permitting activities related to land development within critical habitat units. With regard to other action agencies besides ACOE, personnel responsible for section 7 compliance were generally well informed about the listings of vernal pool species and the impact those listings have had on their agency's activities in the last decade. Hence, other Federal agencies are not likely to be underrepresented in the consultation history, and no future consultations that could be attributed solely to critical habitat designation are predicted.

339. Other economic impacts, most notably stigma impacts, are generally considered to be solely attributable to critical habitat designation. Stigma impacts can derive from uncertainty concerning the scope and impact of critical habitat designation. Stigma associated with the proposed designation may reduce aggregate willingness-to-pay for the land, which, in turn, results in a reduced land value. By definition, stigma effects are associated with perceived regulatory or land-value effects as opposed to actual regulatory or land-value effects. As such, Federal lands are less likely to be subject to stigma effects than private land.

340. As described above, CHD overlaps with about 26,400 acres of private land that is expected to be developed over the next twenty years. The project modification costs, including land value impacts, on the portion of this acreage requiring a section 7 consultation were estimated above and totaled $116.4 million. Any stigma effects that occur will be associated with these 26,400 acres of private land that will likely be transacted between private parties over the next 20 years.

341. Stigma impacts will be most pronounced in the early years after CHD as uncertainties over USFWS project modification requirements and misconceptions concerning the extent and impact of CHD are greatest. Over time, as section 7 consultation experience with critical habitat is developed and this information becomes more widely available, stigma impacts will diminish. As a result, owners of private land transacting in the next several years may incur additional land value losses over-and-above those estimated above. Ultimately, when this land is developed and the actual development potential and associated land value is revealed, the new landowner will recognize a higher land value than originally expected. The size of this stigma impact is impossible to quantify at this time.

## 4.9 POTENTIAL IMPACTS ON SMALL BUSINESSES

342. Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small

businesses, small organizations, and small government jurisdictions).[90] However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.[91] SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. Accordingly, the following represents a screening level analysis of the potential effects of critical habitat designation on small entities to assist the Secretary in making this certification.

343. This analysis determines whether critical habitat potentially affects a "substantial number" of small entities in counties supporting critical habitat areas. It also quantifies the probable number of small businesses that experience a "significant effect." While SBREFA does not explicitly define either "substantial number" or "significant effect," the Small Business Administration (SBA) and other Federal agencies have interpreted these terms to represent an impact on 20 percent or more of the small entities in any industry and an effect equal to 3 percent or more of a business' annual sales.[92] In both tests, this analysis conservatively examines the total estimated section 7 costs calculated in earlier sections of this report, including those impacts that may be "attributable co-extensively" with the listing of the species.

344. This analysis begins by identifying all formal and informal consultation activities generated by the proposed rule that may involve small entities (businesses or governments). The"substantial number" test is then performed for affected industries as well as small governments. Finally, the "significance effect" test is carried out for the same affected industries and for the small governments category.

### 4.9.1 IDENTIFICATION OF ACTIVITIES THAT MAY INVOLVE SMALL ENTITIES

345. Section 3.3 of this report identifies those land use activities that are within the proposed critical habitat designation for vernal pools and expected to be affected by section 7 of the Act. Next, the land use activities identified as being potentially impacted by section 7 implementation (i.e., requiring consultations or project modifications) under the "with section 7" scenario are listed. **Table 19** lists each land use activity that is potentially affected by section 7 implementation.

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[90] 5 U.S.C. 601 et. seq.

[91] Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" **and** a threshold for a "substantial number of small entities." See 5 U.S.C. 605 (b).

[92] See U.S. Small Business Administration, The Regulatory Flexibility Act: An Implementation Guide for Federal Agencies, 1998, accessed at http://www.sba.gov/advo/laws/rfaguide.pdf on December 3, 2001.

**Table 19**
**U.S. Fish and Wildlife Service**
**Vernal Pools Species Critical Habitat Designation Economic Analysis**
**Estimated Number of Future Section 7 Consultations on Land Uses Affecting Vernal Pool Species or Critical Habitat (20 years)**

| Federal/Nexus Activity | Potentially Affected Activities | Informal Consultations | Formal Consultations |
|---|---|---|---|
| Department of Defense | Base operations and training | 16 | 19 |
| Department of Defense | Facilities construction | 0 | 1 |
| Federal Aviation Administration | Runway extensions | 0 | 4 |
| Federal Railroad Administration | Construction of high-speed rail systems | 0 | 1 |
| Federal Transportation Authority | Construction of transit maintenance facilities | 400 | 9 |
| Federal Highway Administration | Construction and maintenance of state highways | 0 | 6 |
| Federal Emergency Management Agency | Disaster response | 0 | 0 |
| Environmental Protections Agency | Discharge to U.S. waters | 0 | 10 |
| Environmental Protections Agency | Characterization and cleanup of contaminated sites | 0 | 0 |
| Federal Energy Regulatory Commission | Operation of hydroelectric facilities | 4 | 5 |
| Federal Energy Regulatory Commission | Oil pipeline conversion | 0 | 0 |
| Western Area Power Administration | Authorization to establish an interconnection | 1 | 0 |
| Western Area Power Administration | Maintenance of power lines | 0 | 0 |
| Bureau of Reclamation | Maintenance of water facility ROW | 0 | 1 |
| Bureau of Reclamation | Power plant construction | 30 | 40 |
| Bureau of Reclamation | Water supply and delivery contracts | 0 | 0 |
| Bureau of Indian Affairs | Fire protection | 207.880928 | 69.29364267 |
| Bureau of Indian Affairs | Casino construction | 0 | 0 |
| Army Corps of Engineers | Land development | 0 | 1 |
| U.S. Fish and Wildlife Services | National Wildlife Refuge operations | 0 | 0 |
| U.S. Fish and Wildlife Services | National Wildlife Refuge mosquito/weed control | 0 | 2 |
| U.S. Fish and Wildlife Services | Habitat Conservation Program | 25 | 29 |
| U.S. Forestry Service | Forestry research | 715.880928 | 228.2936427 |
| U.S. Forestry Service | Forestry management | 0 | 0 |
| **TOTAL** | | **1400** | **426** |

*"future_consult"*

Source: Table 6

346. Of the projects that are potentially affected by section 7 implementation for vernal pool species, some do not have third party involvement (i.e., only the action agency and the Service are expected to be involved). Thus, small entities should not be affected by section 7 implementation for affected projects with the following agencies:

- Department of Defense (base operations and training; facilities construction)
- Fish and Wildlife Service (NWR operations; NWR mosquito/weed control; Habitat Conservation Program)
- Forest Service (forestry research; forestry management)
- Bureau of Reclamation (maintenance of water facility right-of-way; water supply and delivery contracts)

347. Finally, the following projects that are potentially affected by section 7 implementation contain project modifications that take place within the power generation industry. Utilities operating in California are likely to be large corporations (i.e., exceeding the Small Business Association annual sales threshold) such as Pacific, Gas, & Electric (PG&E) and Southern California Edison, which exceed the Small Business Administration's annual sales threshold for small utilities and therefore do not fit the category of small businesses.

- Western Area Power Administration (maintenance of power lines)
- Bureau of Reclamation (power plant construction)
- Western Area Power Administration (maintenance of power lines)
- Federal Energy Regulatory Commission (operation of hydroelectric facilities; oil pipeline conversion)

348. After excluding these two sets of action agencies and consultations noted above from the total universe of impacts identified in the body of the analysis, eight action agencies and associated consultations remain. This subset represents the group of action agencies and consultations that may produce significant impacts on small entities. Specifically, these actions feature activities that do not occur exclusively on Federal lands and may involve relatively costly project modifications:

- Bureau of Indian Affairs (casino construction)
- Army Corps of Engineers (land development)
- Federal Aviation Administration (runway extensions)
- Federal Highway Administration (construction and maintenance of state highways)
- Federal Transportation Authority (construction of transit maintenance facilities)
- Federal Railroad Administration (construction of high-speed rail systems)
- Federal Emergency Management Agency (disaster response)

## 4.9.2 DESCRIPTION OF AFFECTED SMALL ENTITIES

349. This section describes the industries most likely to be affected by section 7 implementation for vernal pool species. More information about affected projects can be found in Chapters 3 and 4 of this report.

### 4.9.2.1 Land Development/Real Estate (SIC 6552)

350. The Small Business Administration defines small businesses within the land development and real estate industry category as having less than $6 million in average annual receipts (also referred to as sales or revenues). Projects permitted by the Army Corps of Engineers (ACOE) that involve section 7 consultations for vernal pool species may affect small businesses under SIC code 6552. In order to determine whether or not small businesses in the land development and real estate industry are affected by ACOE projects, the $6 million threshold must be considered in the analysis.

351. Significant levels of Federal agency review and permitting are often required for land development projects by public and private entities. When development projects propose to fill vernal pools as a means of preparing land for building, Clean Water Act regulations require a project applicant to obtain a 404 permit from the Army Corps of Engineers (ACOE). If the project is located within proposed critical habitat, the requirement that a project obtain a 404 permit from the ACOE also means that a section 7 consultation is likely to be initiated with the Service.

352. To determine the likelihood that development will occur within critical habitat Geographic Information Systems (GIS) analysis was used to calculate overlap between proposed critical habitat and the development projections of an urban growth model designed at the University of California, Berkeley. City & Regional Planning professors at the University developed an urban growth model called the California Urban and Biodiversity Analysis (CURBA) model. The CURBA model uses GIS technology to provide spatial predictions of the extent of urban growth in the year 2020. By overlaying the proposed critical habitat unit areas over CURBA predictions, tentative conclusions can be made about where development is likely to take place within critical habitat.

353. This analysis was instrumental in identifying the location and number of section 7 consultations that are likely to occur across the 37 county study area. It is estimated that 69 formal consultations and 208 informal consultations will take place involving small businesses in the land development and real estate industry.

### 4.9.2.2 Non-Residential Construction (SIC 1542)

354. The Small Business Administration defines small businesses within the non-residential construction industry category as having less than $28.5 million in average annual receipts (also referred to as sales or revenues). Projects partially

funded by the Bureau of Indian Affairs (BIA) that involve section 7 consultations for vernal pool species may affect small businesses under SIC code 1542. In order to determine whether or not small businesses in the non-residential construction industry are affected by BIA projects, the $28.5 million threshold must be considered in the analysis.

355. The BIA's Natural Resources Branch has been involved in one formal vernal pool consultation in the past over trust acquisition for a gaming facility. Project modification costs for this consultation included on-site vernal pool avoidance (set aside), off-site vernal pool creation, fees to hire an outside biological consultant, and project infrastructure modifications to avoid vernal pools.

356. The proposed development consists of a 50,000 square foot gaming casino on approximately 600 acres of land. The BIA would provide Federal funds for trust acquisition on behalf of the involved tribe, which would constitute a Federal nexus under section 7. The majority of these costs would be borne directly by the investors of the gaming enterprise, especially those costs required to comply with the Service's habitat compensation or avoidance requirements. The project modification costs for the proposed gaming facility are estimated to be $860,000.

#### 4.9.2.3 Activities Funded by Small Governments

357. The SBREFA defines a "small governmental jurisdiction" as "governments of counties with a population of less than fifty thousand."[93] This analysis assumes that all small governments with partnerships with the Federal government are affected by consultation activity on those partnerships. All small governments for cities and counties that have a population that is less than 50,000 persons within the total study area constitute the universe of small governments in this analysis. There are 30 unique small governments that are required to undertake formal consultations regarding vernal pool habitat designation. The agencies they represent include the Federal Aviation Administration (FAA), the California Department of Transportation (Caltrans), the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), and the Federal Railroad Administration (FRRA). In addition, 400 informal consultations are proposed involving the construction of and maintenance of state highways by the Federal Highway Administration.

358. The Federal Aviation Administration (FAA) estimates that several runway expansion projects that are planned within the next 20 years may overlap with vernal pool critical habitat. In particular, one ongoing expansion and three proposed expansions are likely to result in consultations with the Service due to the presence of vernal pools. The construction of runway extensions has the potential to impact critical habitat if the proposed construction requires vernal pools to be filled or if associated activities (the movement of heavy equipment, surface grading, etc.) disturb the vernal pools themselves or their upland

[93]U.S.C § 601.

complexes. Runway expansions constitute a Federal nexus in that 90 percent of the construction costs are funded by aviation grants through the FAA, with the remainder paid for by the participating County.

359. The California Department of Transportation (Caltrans) estimates that nine future highway projects in District 3 (Marysville), District 6 (Fresno), and Distrcit 10 (Stockton) will overlap with vernal pool habitat and require formal consultations and biological assessments. In addition, approximately 400 informal consultations will take place across all of Caltrans' districts in the context of discussions with the Service as project site surveys for vernal pool species are performed. Caltrans receives Federal funding from the Federal Highway Administration (FHWA) to perform maintenance and construction of the State's highway system, thus establishing a Federal nexus.

360. There are currently two rail transportation system construction projects planned in California that may overlap with vernal pool critical habitat. The Sacramento Regional Transit District (SacRT) currently has plans to construct a light rail transit maintenance facility ten miles east of Sacramento. County maps indicate that the parcel on which the transit rail is to be development overlaps with critical habitat boundaries. Construction of maintenance facility would be partially funded by Federal Transit Administration grants, which creates a Federal nexus under section 7.

361. The California High Speed Rail Authority is a state agency charged with planning, constructing, and operating a high-speed rail system serving California's major metropolitan areas. The project has the potential to impact vernal pool critical habitat as it traverses virtually every county south of Sacramento that contains critical habitat for vernal pools. The project is funded both by State funds and by Federal grants from the Federal Railroad Administration. The nature of the project's funding constitutes a Federal nexus under section 7. At least one formal consultation, and a possible programmatic consultation, would be required for this project.

362. The Federal Emergency Management Agency (FEMA) is charged with coordinating Federal preparedness for response to, and recovery from, national emergencies. While the scope and location of emergency response activities is by definition difficult to forecast, FEMA nonetheless estimates, based on previous response rates, that approximately six formal section 7 consultations will be required in the next 20 years due to vernal pool species, both related to emergency flood control projects.

### 4.9.3 ESTIMATED NUMBER OF SMALL ENTITIES AFFECTED: THE "SUBSTANTIAL NUMBER" TEST

363. To be conservative, (i.e., more likely to overstate impacts than understate them), this analysis assumes that a unique small business will undertake no more than one project requiring a consultation in a given year, so the number affected is equal to the total annual number of consultations (both formal and informal).

This analysis also limits the universe of potentially affected entities to include only those within the counties in which critical habitat units lie; this interpretation produces a more conservative analysis than including all entities nationwide.

#### 4.9.3.1 Activities of the Army Corps of Engineers and Effects on the Land Development and Real Estate Industry; Activities of the Bureau of Indian Affairs and Effects on the Non-residential Construction Industry

364. First, the number of small businesses affected under the land development and real estate (SIC 6552) and the non-residential construction industry (SIC 1542) are estimated. As shown in **Table 20**, the following calculations are used to arrive at this estimate:

- Estimate the number of businesses within the study area affected by section 7 implementation annually (assumed to be equal to the number of annual consultations). For the Army Corps of Engineers projects that fall under the land development real estate industry, there are 69 estimated formal consultations and 208 estimated informal consultations. For the Bureau of Indian Affairs casino construction project that belongs to the non-residential construction industry (SIC 1542), one formal consultation and zero informal consultations are anticipated.

- Calculate the percent of businesses in the affected industry that are likely to be small. This is calculated by dividing the total number of small businesses in the study area for each SIC code (using the annual sales thresholds from the Small Business Administration described in the previous section) by the total number of businesses in the study area that fall under the same SIC code.[94] The analysis shows that 92 percent of the land development and real estate (SIC 6552) businesses within the study area are small, while 96 percent of businesses that fall under the non-residential construction industry (SIC 1542) within the study area are small.

- Calculate the number of affected small businesses in each affected industry. This is calculated by multiplying the percent of small businesses by the total number of consultations (formal plus informal). For the land development and real estate industry (SIC 6552), 254 small businesses are affected, and for non-residential construction (SIC 1542), one small business is affected.

365. This calculation reflects conservative assumptions and nonetheless yields estimates that are still less than the 20 percent threshold that would be considered "substantial." As a result, this analysis concludes that a significant economic impact on a substantial number of small businesses will not result from the designation of critical habitat for vernal pools.

[94]Dun Market Identifiers, File 516: Dun and Bradstreet, June 2000.

**Table 20**
**U.S. Fish and Wildlife Service**
**Vernal Pools Species Critical Habitat Designations Economic Analysis**
**Estimated Annual Number of Small Businesses Affected by Critical Habitat Designation:**
**The "Substantial Number" Test**

| Industry Name | | Land Development SIC 6552 | Non-Residential Construction SIC 1542 |
|---|---|---|---|
| Annual number of affected businesses in the industry (equal to the number of annual consultations) | By formal consultation | 1 | 0 |
| | By informal consultation | 0 | 0 |
| Number of small businesses in industry within study area | | 1,551 | 2,568 |
| Total number of all businesses in industry (equal to number of annual consultations) | | 1,692 | 2,677 |
| Percent of businesses that are small (number of small businesses) / (total number of businesses) | | 92% | 96% |
| Annual number of small businesses affected (number of affected businesses) * (percent of small businesses) | | 254 | 1 |
| Annual percentage of small businesses affected (number of small businesses affected) / (total number of small businesses); >20% is substantial | | 16% | Less than 1% |

*"num_business"*

Sources: Table 6, Dun and Bradstreet.

#### 4.9.3.2 Activities of the Federal Aviation Administration, Federal Transit Administration, and the Federal Highway Administration and Effects on Small Governments

366. The "substantial number" test for small governments assumes that a unique small government entity will undertake each project that results in a formal consultation during a one-year time frame. However, the analysis assumes that the total number of expected informal consultations will be spread out over 20 years. City governments are not included in the total number of governments incurring informal consultations because the majority of road and highway construction projects occur within the unincorporated areas of counties, and hence, are overseen by county governments. Because there are 36 county governments in the study area (one per county in California), the analysis assumes that each county government will undergo approximately 11 informal consultations over 20 years. The study includes all small governments in the study area under one category (as opposed to the industry method used for the other projects in this analysis). This analysis also limits the universe of potentially affected small government entities to include only those within the counties in which critical habitat units lie; this interpretation produces a more conservative analysis than including all small governments nationwide.

367. First, the number of small governments affected in the study area is estimated.[95] As shown in **Table 21**, the following calculations are used to arrive at this estimate:

- Estimate the number of governments within the study area affected by section 7 implementation annually. For formal consultations, this is assumed to be the number of annual formal consultations. Therefore, 30 county governments are affected. For informal consultations, all 36 county governments in the study area are assumed to be affected because the total number of informal consultations is greater than 36, and must therefore be divided equally among the 36 county governments.

- Calculate the percent of governments in the study area that are likely to be small. This is calculated by dividing the total number of small governments in the study area by the total number of governments in the study area. The analysis shows that 74 percent of the city and county governments within the study area are small.

- Calculate the number of affected small governments in the study area. This is calculated by multiplying the percent of small governments by the total number of consultations (formal plus informal). This analysis shows that 48.9 small governments in the study area are affected.

[95]This population count was obtained from California County Profiles – *A Companion to the 2000 California Statistical Abstract*, California Department of Finance, 2002. All cities and counties within the study area that have a total population less than or equal to 50,000 persons was considered small (according to the Small Business Administration).

**Table 21**
**U.S. Fish and Wildlife Service**
**Vernal Pools Species Critical Habitat Designations Economic Analysis**
**Estimated Number of Small Governments Affected by Critical Habitat Designations:**
**The "Substantial Number" Test**

| Industry Name | | Small Governments |
|---|---|---|
| Annual number of affected governments | By formal consultation [1] | 30 |
| | By informal consultation [2] | 36 |
| Number of small governments in industry within study area | | 194 |
| Total number of all governments (equal to number of annual consultations | | 262 |
| Percent of governments that are small (Number of small governments) / (Total number of governments) | | 74% |
| Annual number of small governments affected (Number of affected governments) / (Percent of small governments) | | 49 |
| Annual percentage of small governments affected (Number of small governments affected) / Total number of small governments); >20% is substantial | | 25.2% |

*"small_gov"*

Sources: Table 6, *2001 California County Profiles* , California Department of Finance.

[1] The annual number of affected governments equals the total number of formal consultations.
[2] Since there are a total of 400 informal consultations affecting federal highway construction, the total number of affected governments is assumed to be the total number of county governments in the study area. It is assumed that the 400 consultations will be spread across county governments equally. In other words, each county governments will engage in an estimate of 11 informal consultations.

- Calculate the percent of small governments likely to be affected by critical habitat. This is done by dividing the number of affected small governments in the study area by the total number of small governments in the study area. This analysis reveals that 25.2 percent of the all small governments in the study area are likely to be affected by vernal pools consultation activity.

368. This calculation reflects conservative assumptions and- yields estimates that are greater than the 20 percent threshold that is considered "substantial." As a result, this analysis concludes that a significant economic impact on a substantial number of small governments will result from the designation of critical habitat for vernal pool species.

## 4.9.4 ESTIMATED EFFECTS ON SMALL ENTITIES: THE "SIGNIFICANT EFFECT" TEST

### 4.9.4.1 Activities of the Army Corps of Engineers and Effects on the Land Development and Real Estate Industry; Activities of the Bureau of Indian Affairs and Effects on the Non-residential Construction Industry

369. The "Substantial Number" test estimated that less than 20 percent of small businesses in land development and real estate as well as non-residential construction will be affected by section 7 consultation activity. Costs of critical habitat designation to small businesses consist primarily of the cost of participating in section 7 consultations and the cost of project modifications.

370. To calculate the likelihood that a small business will experience a significant effect from critical habitat designation for vernal pool species, the following calculations were made:

- Calculate the per-business cost. This consists of the unit cost to a third party of participating in a section 7 consultation (formal or informal) and the unit cost of associated project modifications. To be conservative, this analysis uses the high-end estimate for each cost. For the land development industry, the per-business formal consultation cost for a the small businesses within the land development real estate category is estimated to be $2 million. For the small businesses within the non-residential construction category, the per-business formal consultation cost is estimated to be approximately $870,000. Per-business costs for formal consultations are derived by first dividing total consultation cost for each industry by the total number of consultations, and then adding per unit costs for project modifications and biological assessments. The per-business informal consultation cost for both industries is approximately $2,900.

- Determine the amount of annual sales that a company would need to have for this per-business cost to constitute a "significant effect." This is calculated by dividing the per-business cost by the 3 percent "significance" threshold value.

Each small business within the land development and real estate category would have to generate less than $67 million in annual sales for the per-business cost of $2 million to constitute a "significant effect." Likewise, all small businesses within the non-residential construction category would have to generate less than $29 million in annual sales in order for the $870,000 per-business cost to constitute a "significant effect."

- Estimate the likelihood that a small business in the study area will have annual sales equal to or less than the threshold amount calculated above. This is estimated using national statistics on the distribution of sales within industries. For both industry categories, 100 percent of the small businesses in the study area will have sales equal to or less than their respective threshold amounts.

- Based on the probability[96] that a single business may experience significant effects, calculate the expected value of the number of businesses likely to experience a significant effect. For small businesses within the land development and real estate industry, 69 small businesses are likely to experience a significant effect, while for the non-residential construction category, one small businesses are likely to experience a significant effect.

- Calculate the percent of businesses in the study area within the affected industry that are likely to be affected significantly. This is calculated by dividing the total number of small businesses bearing significant costs for each industry by the total number of small businesses in the same industry. For the land development and real estate industry, 4 percent of small businesses in the industry are likely to bear significant costs, while less than 1 percent of the small businesses in the non-residential construction industry are likely to bear significant costs.

371. Calculations for costs associated with section 7 implementation for vernal pools are provided in **Table 22**.

372. The costs associated with section 7 are expected to be significant for 0 percent of the non-residential construction industry potentially affected by section 7 requirements. Although 2 percent of the small land developers affected by section 7 are expected to experience significant effects, the "substantial number" proved that the land development industry will not contain a substantial number of small businesses affected by the section 7 costs. Therefore, this analysis concludes that a significant economic impact on a substantial number of small entities will not result from the designation of critical habitat for vernal pools.

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[96]This probability is calculated based on national industry statistics obtained from the *R.A. Annual Statement Studies: 2001-2002*, which provides data on the distribution of annual sales in an industry within the following ranges: $0-1 million, $1-3 million, $3-5 million, $5-10 million, $10-25 million, and $25+ million. This analysis uses the ranges that fall within the SBA definition of small businesses (i.e., for industries in which small businesses have sales of less than $5.0 million, it uses $0-1 million, $1-3million, and $3-5 million) to estimate a distribution of sales for small businesses. It then calculates the probability that small businesses have sales below the threshold value.

**Table 22**
**U.S. Fish and Wildlife Service**
**Vernal Pools Species Critical Habitat Designations Economic Analysis**
**Estimated Annual Effects on Small Businesses: The "Significance Effect" Test**

| Industry Name | Land Development - SIC 6552 | | Non - Residential Construction - SIC 1542 | |
|---|---|---|---|---|
| | By Formal Consultation | By Informal Consultation | By Formal Consultation | By Informal Consultation |
| Annual number of small businesses affected (From Exhibit 12) | 69 | 208 | 1 | 0 |
| Per-Business cost | $1,694,500 | $2,900 | $869,700 | $2,900 |
| Level of annual sales below which effects would be significant (percent business cost / 3%) | $ 56,485,000 | $ 97,000 | $ 28,990,000 | $ 97,000 |
| Probability that per-business cost is greater than 3% of sales for small business [1] | 100% | 10% | 100% | 10% |
| Probable annual number of small businesses experiencing significant effects (number small businesses ) * (probability of significant effect) [2] | 69.0 | | 1.0 | |
| Total annual percentage of small businesses bearing significant costs in industry [2] | 4% | | 0.04% | |

*"effect_business"*

Sources: Table 6, Robert Smith Associates' (RMA) 2001-2002 *Annual Statement of Studies.*

[1] This probability is calculated based on national industry statistics obtained from the RMA Annual Statement Studies: 2001-2002, which provides data on the distribution of annual sales in an industry within the following ranges: $0-1 million, $1-3 million, $3-5 million, $5-10 million, $10-25 million, and $25+ million. This analysis uses the ranges that fall within the SBA definition of small businesses (i.e., for industries in which small businesses have sales of less than $5.0 million, it uses $0-1 million, $1-3million, and $3-5 million) to estimate a distribution of sales for small businesses. It then calculates the probability that small businesses have sales below the threshold value.

[2] The results of the calculations for formal and informal consultations were added together, as it is the sum of two scenario that constitutes the significant effect.

#### 4.9.4.2 Activities of the Federal Aviation Administration, Federal Transit Administration, and the Federal Highway Administration and Effects on Small Governments

373. The significance test for small governments affected by section 7 consultation activity consisted of a slightly different methodology than for the significance test done for the Land Development/Real Estate and Non-residential construction industries. All consultations that affect small governments (regardless of the industry to which each belongs) are pooled into one category. Two scenarios are included in this analysis. Scenario 1 assumes that the life of a local government project requiring a consultation is one year. Therefore, Scenario 1 assumes that a local government will bear the total cost of each consultation within a one-year period. Scenario 2, on the other hand, assumes that the life of a government project such as road construction, will span a period of seven years.[97]

374. While Scenario 1 takes a conservative approach to calculating section 7 cost impacts borne by local governments, Scenario 2 assumes a more realistic time frame over which costs are spread. Conducting both scenarios for the "significant effects" test is helpful for determining the range of impacts of section 7 on local government revenues. Shown in **Table 23** are the following steps describe the methodology used for the significance effect test for small governments:

- Calculate the per-government cost. This consists of the unit cost to a third party participating in a section 7 consultation (formal or informal) and the unit cost of associated project modifications and biological assessments. To be conservative, this analysis uses the high-end estimate for each cost. For small governments, the per-government formal consultation cost is approximately $91,753 (Scenario 1), and $16,622 (Scenario 2). The per-government informal cost is $1,595 (for both scenarios).

- Determine the amount of annual revenues that a small government would need to have for this per-business cost to constitute a "significant effect." This is calculated by dividing the per-business cost by the 3 percent "significance" threshold value. Each small government would have to generate less than $3 million in annual revenues for the per-government cost of $91,753 to constitute a "significant effect" (Scenario 1). Each small government would have to generate less than $554,000 in annual revenues for the per-government cost of $16,622 to constitute a "significant effect" (Scenario 2).

- Estimate the likelihood that a small government in the study area will have annual revenues equal to or less than the threshold amount calculated above. This is estimated using local government revenue data from the California State Controller's Office. For small governments, 22 percent in the study area

[97] Personal communication with Transportation Planner with the Sacramento Area Council of Governments (SOAKAGE), Oct. 25, 2002.

**Table 23**
**U.S. Fish and Wildlife Service**
**Vernal Pools Species Critical Habitat Designations Economic Analysis**
**Estimated Annual Effects on Small Government: The "Significant Effect" Test**

| Industry Name | Small Governments [1] | | | |
|---|---|---|---|---|
| | Scenario 1 [2] | | Scenario 2 [2] | |
| | By Formal Consultation [3] | By Informal Consultation [3] | By Formal Consultation [3] | By Informal Consultation [3] |
| Total number of small governments affected | 30 | 36 | 30 | 36 |
| Per-government cost | $91,753 | $1,595 | $16,622 | $1,595 |
| Level of annual revenue below which effects would be significant (per-business cost / 3%) | $3,058,000 | $53,000 | $554,000 | $53,000 |
| Probability that per-government cost is greater than 3% of revenue for small government [1] | 22% | 0% | 4% | 0% |
| Probable annual number of small governments experiencing significant effects (number of small governments) * (probability of significant effect) [4] | 3.6 | | 0.7 | |
| Total annual percentage of small governments bearing significant costs [4] | 2% | | Less than 0% | |

*"effect_gov"*

Sources: Table 6, *2001 California County Profiles* , California Department of Finance, CA State Controller's 2002 Counties Cities Annual Report. Annual Report, 2001, SCAOG Transportation Department.

[1] A sample of annual revenues for 71 small governments within the study area was generated using revenue data from 2001 Cities Annual Report and 2002 Counties Annual Report, California State Controller. Based on the sample, the highest annual revenue amount generated by a small government was assu to be the bin maximum. This is for purposes of translating the population-based count of small governments to a financially-based definition like that for the industry analysis. 100% of the small governments in the study area, therefore, generate sales that are equal to, or less than the bin maximum, while the sample indicates that 73% of small governments generate annual revenues equal to or less than the $3 million threshold.

[2] Scenario 1 assumes that the life of each project for which a consultation is required is one year. This represents a conservative approach for this test. Scenario 2 assumes that the life of each project is 7 years, which is the more realistic average life of a major transportation infrastructure project (based on personal communication with the transportation planning department of the Sacramento Council of Governments on Oct. 25, 2002.

[3] Since there are a total of 400 informal consultations affecting federal highway construction, the total number of affected governments is assumed to be the total number of county-governments in the study area. It is assumed that the 400 consultations will be spread across county governments equally. In other words, each county government will engage in an estimate of 11 informal consultations. Furthermore, the average life of a project involving informa consultations is assumed be 20 years. Therefore, the unit costs of an informal consultation cost is divided by 20.

[4] The results of the calculations for formal and informal consultations were added together, as it is the sum of two scenario that constitutes the significant effect.

will have revenues equal to or less than their respective threshold amounts (Scenario 1). For Scenario 2, 4 percent of small governments in the study area will have revenues equal to or less than their respective threshold amounts.[98]

- Based on the probability that a single government may experience significant effects, calculate the expected number of governments that are likely to experience a significant effect. In Scenario 1, 3.6 small governments are likely to experience a significant effect, while in Scenario 2, less than one small government is likely to experience a significant effect.

- Calculate the percent of small governments in the study area that are likely to be affected significantly. The calculation divides the total number of small governments bearing significant costs by the total number of small governments in the study area. This analysis shows that 2 percent of small governments within the study area are likely to bear significant costs according to Scenario 1, while no small governments are likely to bear significant costs under Scenario 2.

[98] A sample of annual revenues for 71 small governments within the study area was generated using revenue data from *2001 Cities Annual Report* and *2002 Counties Annual Report*, California State Controller. Based on the sample, the highest annual revenue amount generated by a small government was assumed to be the bin maximum. This is for purposes of translating the population-based count of small governments to a financially-based definition like that for the industry analysis. One hundred percent of the small governments in the study area, therefore, generate sales that are equal to or less than the bin maximum, while the sample indicates that 73 percent of small governments generate annual revenues equal to or less than the $3 million threshold.

# V. POTENTIAL BENEFITS OF PROPOSED CRITICAL HABITAT

375. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop [1978, 1980], Brookshire and Eubanks [1983], Boyle and Bishop [1986], Hageman [1985], Samples *et al*. [1986], Stoll and Johnson [1984]). Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran [1994] and Fausold and Lilieholm [1999]) both of which are associated with species conservation. Likewise, regional economies can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

376. The primary goal of the Act is to enhance the potential for species recovery. Thus, the benefits of actions taken under the Act are primarily measured in terms of the value placed by the public on species preservation (e.g., avoidance of extinction, and/or an increase in a species' population). Such social welfare values may reflect both use and non-use (i.e., existence) values. For example, use values might include the potential for recreational use of a species, should recovery be achieved. Non-use values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist.

377. In addition, as a result of actions taken to preserve endangered and threatened species, various other benefits may accrue to the public. Such benefits may be a direct result of modifications to projects made following section 7 consultation or may be collateral to such actions. For example, a section 7 consultation may result in the requirement that residential construction projects avoid removal of soils on certain steep slopes where listed species occur. The relocation of the building site may directly benefit the listed species or its critical habitat, while reduced sedimentation into nearby creeks from the building site may provide the collateral benefits of improving water quality and fish habitat.

378. This chapter describes the benefits resulting from implementation of section 7 of the Act in the context of areas affected by the proposed designation. It then discusses the extent to which existing valuation studies can be used to monetize these benefits. Finally, it discusses whether these benefits can be defined on a unit-by-unit basis and whether these benefits attributable to critical habitat designation can be distinguished from all section 7-related benefits.

379. As discussed below, it is not feasible to fully describe and accurately quantify the benefits of this designation in the context of this economic analysis. The discussion presented in this report provides examples of potential benefits, which derive primarily from the listing of the species, based on information obtained in the course of developing the economic analysis. It is not intended to provide a

complete analysis of the benefits that could result from section 7 of the Act in general or critical habitat designation in particular. *Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

## 5.1 CATEGORIES OF BENEFITS

380. Implementation of section 7 of the Act is expected to substantially increase the probability of recovery for the species. Such implementation includes both the jeopardy provisions afforded by the listing, as well as the adverse modification provisions provided by the designation. Specifically, the section 7 consultations that address vernal pool species will assure that actions taken by Federal agencies do not jeopardize the continued existence of the species or adversely modify its critical habitat. Note that these measures are separate and distinct from the section 9 "take" provisions of the Act, which also provide protection to this species.

381. The benefits of critical habitat designation can therefore be placed into two broad categories: those associated with the primary goal of species recovery, and those that derive mainly from the habitat protection required to achieve this primary goal. The sections below describe these two categories of benefits.

### 5.1.1 BENEFITS ASSOCIATED WITH SPECIES RECOVERY

#### 5.1.1.1 Existence Value

382. A number of published studies have demonstrated that the public holds values for endangered and threatened species separate and distinct from any expected direct use of these species (i.e., a willingness to pay to simply assure that a species will continue to exist). These studies include Boyle and Bishop (1987), Elkstrand and Loomis (1998), Kotchen and Reiling (2000), and Loomis and White (1996). While the public's willingness to pay for preservation and enhancement of a wide-range of species has been studied, no studies have addressed the non-use values associated with endangered vernal pool species. Thus, it is not possible to develop a monetary measure of this category of benefit.

#### 5.1.1.2 Vernal Pool Conservation Bank Revenue

383. As discussed in Chapter 4 of this report, one mechanism for development to continue in areas where occupied vernal pools are present is for a developer to mitigate for alterations to natural vernal pool habitat by purchasing off-site preservation credits in vernal pool conservation banks. The Service has accepted this as one tool among many to achieve adequate compensation for development-related vernal pool disturbance and to insure the continued survival of vernal pool species. To the extent that the proposed critical habitat designation intensifies the regulation of development in vernal pool habitat and increases the likelihood that developers will purchase credits from vernal pool conservation

banks, one might expect critical habitat designation to contribute to the expansion of the industry segment offering conservation bank credits for sale in California and Oregon.

384. The brief discussion that follows is highly generalized and does not allow for the quantification of a net benefit to a regional economy if conservation bank revenues increase. Vernal pool compensation and avoidance requirements represent a cost to development and may be avoidable altogether if other feasible development sites can be located outside of critical habitat. The project modifications estimated in Chapter 4, however, would suggest that a sizeable financial benefit to economic agents in the conservation bank industry is likely.

385. Growth in the incomes of conservation bank owners and related increases in the values of land used for vernal pool species mitigation is expected over time as private development projects sited within habitat units for Group A species pursue Federal permits and must complete section 7 consultations. Project modifications include the purchase of credits that fund conservation bank certification by the Service, oversight by biologists knowledgeable of vernal pool flora and fauna, and annual operating expenses for the property that contains the conservation bank.

386. To become a conservation bank, however, the owner must place the equivalent of a conservation easement on the property that removes any potential gain in value from future development on the property. In that sense, this benefit can be viewed as an advance compensation to landowners who might be able at some point in time to sell the property for development as the urbanized boundary grows closer and the speculative value of the land grows. However, there may be banks located in areas with a very remote probability of ever being developed and the payment of a purchase price by a conservation bank owner would create a gain in the land's market value. The owner then benefits from the collection of credit funds as portions of the property are sold to a series of development applicants obligated to purchase credits to mitigate for vernal pool fill.

#### 5.1.1.3 Genetic Preservation

387. The possibility that a particular species might someday yield significant biological, medical, or commercial value that has yet to be discovered is a common argument for species preservation. By this reasoning, even comparatively small populations warrant preservation, especially those that exhibit significant genetic differentiation from related taxa. Although this is a potential economic benefit related to species protection under section 7, it is impossible to predict the likelihood that a given species will yield potentially valuable information in the future, and within a specific time frame (i.e., 20 years) in particular.

388. One notable example involves the potential future commercial use of one of the vernal pool plant species. According to the California Environmental Resource

Educations System (CERES), the Butte County Meadowfoam (*Limnanthes* spp.) is currently being investigated as a new source of oil to replace animal-based oils in industrial applications. The likelihood that this plant will yield a commercially viable source of industrial lubricant is impossible to determine at this time, as is a quantification of the economic benefits that could potentially result. To the extent that protections under section 7, and critical habitat designation in particular, contribute to the continued existence of the species, future commercial revenue from the Butte County Meadowfoam, or other protected vernal pool species, can be considered a benefit of the designation.

## 5.1.2 BENEFITS ASSOCIATED WITH HABITAT PROTECTION

### 5.1.2.1 Ecosystem Health

389. The Federally listed vernal pool species are an integral part of the ecosystems in which they live. Likewise, these vernal pool ecosystems are essential to the healthy function of neighboring and regional ecosystems. Many other species rely on vernal pool habitat for foraging, habitation, and reproduction. A variety of waterfowl species migrate bi-annually across the Central Valley, which is part of the pacific flyway between Alaska and South America (Heitmeyer, et al., 1989). In the spring, a variety of waterfowl species have been observed feeding and resting in vernal pools, and feeding on the flora and fauna that inhabit these pools.

390. A study conducted by the Service's Sacramento office observed 86 different avian species flying over, foraging, resting, or feeding in vernal pool habitat in northern California and California's Central Valley (Silveira, 1998). In addition, a number of other species live and forage in vernal pool habitat, including the state listed Swainson's hawk, California red-legged frog, and San Joaquin kit fox, as well as deer and other non-endangered game species. The importance of vernal pool habitat to other endangered species is evidenced by the Service's acceptance of "nested" mitigation acres, whereby a single preserved or created vernal pool acre may also count towards mitigation requirements for other species, like the Swainson's hawk and red-legged frog.

### 5.1.2.2 Recreational Benefits

391. The proposed critical habitat designation includes over 1.6 million acres of land in California and Oregon, which provides habitat for a number of plant and animal species, both federally listed and otherwise. In addition, the proposed designation may result in the preservation of habitat for recreational uses, including sightseeing, photography, hiking, biking, birdwatching, and hunting. Conservation of vernal pool habitat may lead to increased tourism and contribute to the expansion of a tourist and resource-based economies in certain

communities.[99] In addition, such activities are likely to generate social welfare benefits to recreators. No data is available, however, that would allow a quantification of the incremental recreational use benefits provided by the proposed designation.

#### 5.1.2.3 Other Benefits

392. Measures undertaken to protect vernal pool habitat could lead to other benefits including protection and enhancement of property values. While the designation of critical habitat could lead to a decrease in the market value of some land (see "Stigma Effects" section in Chapter 4), other properties may experience an increase in property values associated with the positive benefits of being located within or adjacent to preserved and scenic open space. Again, however, quantification and monetization of these categories of benefits would require additional, detailed information.

393. Additional benefits of designating critical habitat for vernal pools may include educational/informational benefits (increased awareness by the public of the extent of vernal pool habitat), cultural benefits, increased support for existing conservation efforts, and reduced uncertainty regarding the extent of vernal pool habitat. From a cultural perspective, for example, vernal pools may hold clues to California's early history as archaeological evidence suggests that Native Americans focused hunting efforts in and around vernal pools (CERES database, 2002). From a regulatory perspective, critical habitat designation will provide a firm legal definition of the extent of vernal pool habitat, which may reduce regulatory uncertainty. Though such benefits may result from the proposed designation, at this time sufficient information does not exist to quantify them and it is thus not possible to present monetized benefits on a unit-by-unit basis.

## 5.2 PLACING MONETARY VALUES ON THE BENEFITS OF SECTION 7 IMPLEMENTATION

394. Sufficient information does not exist to allow for quantification of the secondary benefits of habitat protection (e.g., habitat enhancement for other species and of property values). One kind of useful data for this purpose would be a measure of the public's willingness to pay to enhance the probability of recovery of an endangered plant or crustacean species. At this time, studies of the monetary value of vernal pool species recovery and protection of vernal pool habitat do not exist in the economics literature.

395. In general, benefits transfer is the method used by economists to apply the results of existing valuation studies to a new policy question. Two core principals of defensible benefits transfer are (1) the use of studies that apply acceptable

[21]Of course, if designation of critical habitat somehow constrains these activities, these constraints will be manifest as a cost of the designation.

techniques to generate welfare values, and (2) similarity between the good being valued in the literature and the good being valued in the policy context to which the transfer is being made. Several wetland valuation studies were identified that may be useful for a benefits transfer evaluation with respect to the potential economic benefits of vernal pools.

396. In 1997, Costanza et al. published a study in the journal *Nature* which attempted to estimate the value of the world's ecosystem services and natural capital by synthesizing a number of published studies and performing original calculations where necessary. This study addressed the economic contributions of 16 different "biomes" to 17 "ecosystem services," including the contribution of wetland ecosystems to such services as disturbance regulation (e.g., flood control), water supply (e.g., storage), and waste treatment. The study concluded that freshwater wetlands contributed on average approximately $2,930 per year on a per-acre basis to disturbance regulation, $3,080 per year to water storage, and $670 per year to waste treatment.

397. Of the source studies that Costanza et al. relied upon to calculate these values, those that focused on floodplain (vs. coastal) freshwater wetland systems in the United States (vs. foreign countries) yielded higher estimates than the averages reported in the *Nature* study. Flood control protection services were valued based on estimates of prevented damage and the cost of replacing the service by artificial construction, and yielded estimates of approximately $4,500 per acre per year (Thibodeau & Ostro, 1981). Water supply estimates were based on the additional cost to obtain water from the next best source, and were estimated to be approximately $6,100 per acre per year (Gupta & Foster, 1975).

398. These studies are useful in framing the potential economic value of vernal pool habitat from a benefits transfer perspective, because they provide peer-reviewed economic estimates of wetland habitats. Nevertheless, based on (1) the relatively small number of available wetland valuation studies, and (2) the inherent difficulties in transferring benefits estimates from generalized wetlands in other parts of the world to seasonal vernal pool wetlands in California, this analysis does not rely on the studies described above to provide a quantitative estimate of the economic benefit of vernal pool habitat. While the quantitative estimates above can be considered preliminary starting points for a discussion of the benefits of vernal pools, additional vernal pool specific studies will need to be performed before a defensible estimate can be reached.

## 5.3 ASSIGNING BENEFITS ON A UNIT-BY-UNIT BASIS AND TO THE CRITICAL HABITAT DESIGNATION

399. Where possible, the benefits of critical habitat designation should be described on a unit-by-unit basis and distinguished from the benefits that result from implementation of the jeopardy provisions of section 7 of the Act. The potential benefits described above – existence value, conservation bank revenue, genetic preservation, ecosystem benefits, recreational/educational/cultural benefits, and

regulatory streamlining benefits – are all potentially associated with any given habitat unit. For this reason, and the fact that no quantitative estimate of economic benefits was possible, no attempt was made to estimate the relative degree of potential benefits among proposed critical habitat units.

400. Because some counties have traditionally been under-represented in the consultation history relative to the proportion of vernal pool habitat they contain, as discussed in Chapter 4, a greater share of future consultations and project modifications will be attributable to critical habitat designation. Hence, the relative distribution of future benefits is likely to be similar to the cost distribution shown in **Table 18**.

401. It is not feasible, however, to fully describe and accurately quantify these benefits in the specific context of this economic analysis. For example, most of the studies in the economics literature do not allow for the separation of the benefits of listing (including the Act's take provisions) from the benefits of critical habitat designation. The quantification of total economic benefits attributable to the designation of vernal pool species critical habitat would be, at best, difficult. In short, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.

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